[H.A.S.C. No. 109–72]

HEARING

ON

NATIONAL DEFENSE AUTHORIZATION ACT FOR FISCAL YEAR 2007

AND

OVERSIGHT OF PREVIOUSLY AUTHORIZED PROGRAMS

BEFORE THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES
ONE HUNDRED NINTH CONGRESS

SECOND SESSION

STRATEGIC FORCES SUBCOMMITTEE HEARING

ON

BUDGET REQUEST FOR SPACE ACTIVITIES

HEARING HELD
MARCH 16, 2006

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FISCAL YEAR 2007 NATIONAL DEFENSE AUTHORIZATION ACT—BUDGET REQUEST FOR SPACE ACTIVITIES

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
STRATEGIC FORCES SUBCOMMITTEE,
Washington, DC, Thursday, March 16, 2006.

The subcommittee met, pursuant to call, at 1 p.m., in room 2212, Rayburn House Office Building, Hon. Terry Everett (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. TERRY EVERETT, A REPRESENTATIVE FROM ALABAMA, CHAIRMAN, STRATEGIC FORCES SUBCOMMITTEE

Mr. EVERETT. The hearing will come to order.

The subcommittee meets today to receive testimony on the Department of Defense's fiscal year 2007 budget request for space activities.

Thank you all for coming.

Our guests today are Dr. Ronald Sega, Undersecretary of the Air Force; Dr. Donald Kerr, Director, National Reconnaissance Office (NRO); Lieutenant General Frank Klotz, Acting Commander, Air Force Space Command.

Gentlemen, the subcommittee holds a great deal of interest in maintaining the space capabilities essential for military operations. The warfighters' reliance on space operations will continue to grow, and the management of our space programs must enable future technology development within the limits of a tightening budget.

Along these lines are three critical areas we would like for you to address before the subcommittee today. First, we would greatly appreciate an update on the status of the space cadre. In my mind, nothing can be more important for the success of our space program than the development of a competent and capable force of space professionals. Numerous studies have identified a deficit in our space professionals or the space cadre. It is critical that we aggressively address the shortfall in order to develop a corps of professionals that are competent in both technology and acquisition practices and capable of leading our space programs into the future.

Second, the subcommittee would like to see what measures are being taken to ensure that our future investments in space will not continue down the old familiar track of cost overruns and program delays.

Programs such as the Military Strategic, Tactical & Relay Satellite (MILSTAR), Space-based Infrared System (SBIRS)-High, Advanced Extremely High Frequency (EHF), Future Imagery Archi-

tecture (FIA) and Evolved Expendable Launch Vehicle (EELV) reflect significant programs in the way we have been doing business. I ask that you discuss the steps you are taking to address the problems that continue to plague our space programs.

Finally, I would ask you to address the operational integration of space. Finding new and better ways to leverage our space assets is critical in today's battle environment. Initiatives such as the Operationally Responsive Space (ORS) give us hope that we can find innovative ways to acquire and deploy new space systems at much lower costs.

Programs like Tactical Satellite (TacSat) bring hope that we can change the way we think about space systems and gain the ability to rapidly respond to the warfighters' need for space support. Along the way, we may also gain some long-term benefits by broadening the industrial base and testing new technologies.

Today the topic at hand is the fiscal year 2007 budget request for space activities. Along with my subcommittee colleagues, I look forward to an informative hearing.

Now let me introduce my good friend, Mr. Reyes, for his comments.

STATEMENT OF HON. SILVESTRE REYES, A REPRESENTATIVE FROM TEXAS, RANKING MEMBER, STRATEGIC FORCES SUBCOMMITTEE

Mr. REYES. Thank you, Mr. Chairman, and I join you today in welcoming our distinguished witnesses, Air Force Undersecretary, Dr. Ronald Sega, the NRO director, Dr. Donald Kerr, and Acting Air Force Space Commander, Lieutenant General Klotz. I want to thank each of you for your service to our country and for taking time to be with us today.

Mr. Chairman, our witnesses will present highlights of the fiscal year 2007 budget request for space activities. Space systems afford extraordinary benefits to our troops in combat and are increasingly integrated into the fabric of our weapons systems and our military operations.

It is hard to overstate the importance of space systems to our troops on the ground or, for that matter, to each of us in our everyday activities. We have all seen the pictures of precision-guided munitions that depend on Global Positioning System (GPS) signals, and most of us have purchased gas using a credit card that was authorized through a satellite communications link.

Yet our ability to exploit the benefits of space is threatened by two trends. First, as Chairman Everett has often reminded us here in the committee, the cost of developing and launching satellites has literally skyrocketed. Second, space is increasingly seen as a potential battlefield.

The committee has been concerned about both of these trends. Last July, in fact, our subcommittee held a hearing devoted to exploring those space acquisition problems. And during the fall the committee's defense review threat panel held an unclassified hearing on space security and took a classified briefing on space threats.

Within the limits of what we can discuss publicly, I hope that the witnesses will address both of these trends during our hearing this

afternoon. How can we improve the acquisition system needed to maintain and improve our space capabilities? And also, what can we do to improve the security and the awareness of our assets that are currently in orbit?

To set the stage for the discussion of acquisition improvements, I would like to remind our witnesses of a key finding in the testimony of a Government Accountability Office (GAO) report before our subcommittee last summer: "Overall, we have found that Department of Defense (DOD) has been unable to match resources—technology, time, money—to those requirements before beginning individual programs, setting the stage for technical and other problems, which lead to cost and schedule increases."

Specifically, GAO found the following three points: Satellite requirements are either inadequately defined at the beginning of a program or changed significantly once that program has begun. Technologies are often not mature enough to be integrated into a final product. And the third point, cost estimates are therefore often unreliable.

GAO also concluded that, "DOD starts more programs than it can afford, creating a set of incentives and pressures that invariably have negative effects on individual programs and the larger investment portfolio."

While I commend Dr. Sega and Dr. Kerr for taking steps to revise the acquisition strategy for key systems, including TSAT, SBIRS-High and FIA, the subcommittee has been concerned that we are biting off much more than we can chew in space weapons and systems development.

For that reason, Congress has slowed development of selected programs and systems through the budget process. The Department, the Intelligence Community and the Congress must work together to put our national security space programs on an affordable, sustainable track.

One promising approach to improving space acquisition practices is the TacSat, or operationally responsive space program. This program was created to rapidly deliver to the warfighter low-cost tactical capabilities and to stimulate the development of a new business model for developing and for employing space systems.

I believe that if properly funded and supported, this program can serve as a test bed for the larger space program by providing increased access to space for testing critical research and development payloads.

And while physics and mission requirements preclude certain roles for TacSats, I hope our witnesses today will discuss how we might mix TacSats with larger, more expensive systems in an overall architecture that simplifies the mission of individual satellites and results in a more affordable solution to meeting our everyday needs.

Unfortunately, a recent GAO report on the TacSat program commissioned by our chairman, Chairman Everett, found that "DOD lacks a department-wide strategy and leadership for implementing efforts in this area. Because key advocates of the experiments have left DOD, it is now unclear how well the experiments will be supported in the future."

So I hope the witnesses will speak to this issue today and that the department will allay concerns about DOD's commitment to this program in response to the requirement in section 913 of the fiscal year 2006 defense authorization bill to prepare a report by providing a plan for the creation of a joint program office for the TacSat program.

As to the second trend, space as a potential battleground, while I understand that raising questions related to threats in our space assets potentially can open up a can of worms, I know, Mr. Chairman, that I believe that members from both sides of this aisle can benefit from an unclassified discussion about our interest in assuring both our commercial and our military use of space.

Space is not your traditional battlefield. We need to understand the shape of this terrain, potential threats to our space assets and the need for increased awareness of space activities.

Mr. Chairman, I appreciate the fact that these issues are difficult to talk about in open session, but much has been written in the unclassified literature on all of these subjects. To the extent that they can, I encourage our witnesses today to address unclassified aspects of these issues in their testimony.

With that, Mr. Chairman, I want to again thank you for scheduling this hearing and also for scheduling a closed briefing on these very vital and important issues in two weeks.

I want to again welcome our guests. I know we have much ground to cover, and I look forward to hearing from our distinguished visitors. So with that, I yield back the balance of my time.

[The prepared statement of Mr. Reyes can be found in the Appendix on page 33.]

Mr. EVERETT. I appreciate my good friend's comments.

I would simply say that while much has been written in the press, there is a great deal of it that has not been accurate. And I would not like to see our panel confirm or deny any of that information, because once you do that, then all of a sudden you put down a benchmark to the validity of that particular subject.

But I, too, agree that we have to have an open conversation about this, and we will. And we will also have some closed briefings on it.

Let me say to the witnesses a couple of things today. First of all, if you will, please don't read your entire statement. If you have a brief statement—I have got one here that weighs about a half pound. I won't say where it came from. [Laughter.]

But if you will, make the statement brief. I don't know that we can do this, but we are going to have probably a really long series of votes at 2 o'clock. And I would hate to see this hearing turn into four hours or five hours or something like that and you would have to wait around for an hour. So if you could. Your entire statements will be entered into the record.

And, Dr. Sega, you are first at bat.

STATEMENT OF HON. RONALD M. SEGA, UNDER SECRETARY OF THE AIR FORCE, DEPARTMENT OF THE AIR FORCE

Dr. SEGA. Mr. Chairman and Congressman Reyes and distinguished Members of the committee, I am honored to appear before

you today to discuss national security space. I thank you for putting my written statement in the record.

As the Undersecretary of the Air Force and DOD executive agent for space, I am committed to improving the space capabilities on which our commanders and forces depend to conduct their missions. I thank this committee and the entire Congress for your support of national security space efforts.

Today I want to outline the importance of space to our warfighters and then focus on three areas, and initially on just one of those for national security space.

During the last hurricane season, we witnessed weather satellites tracking hurricanes and rescuers using GPS and satellite imagery to direct relief efforts to the hardest-hit areas. I would like to relay two lesser-known examples of the effectiveness of space systems.

The first example concerns the space support for the humanitarian mission that was conducted in the Philippines. Space capabilities played a unique role in the relief effort after a massive mudslide buried an entire village on the island of Leyte.

Within hours of the disaster, a Hawaii Air National Guard combat communications unit that was in the area on an exercise switched into real-world humanitarian relief mode. They used their Eagle Vision system to quickly merge archival commercial satellite imagery with mapping software called Falcon View to produce photos and grid maps of the area.

They then distributed them to relief forces coming from mainland China and Okinawa. The archival images provided a quick look at the air fields that our airlift and rescue squads would use.

Then they used an Eagle Vision to order, collect and process new commercial imagery of the affected area, and they shared the important data with U.S. responders and Philippine government agencies. This included images that compared the area before and after the mudslide and enabled the authorities to move effectively to plan the rescue and relief operations.

The second example comes from Operation Iraqi Freedom; specifically, March 26, 2003, the nighttime parachute drops of the Army's 173rd Airborne Brigade. The weather is rough; the mountains of northern Iraq probably even rougher.

I had actually the opportunity to talk to Captain John Roberts, now Major Select John Roberts, U.S. Air Force combat weatherman. He has been in the service about 10 years. Nine of those 10 years he has actually been assigned to U.S. Army units—a native of Los Angeles, school in Nebraska, eight jumps short of master jump wings.

But in a particular assignment he was out of Italy and the planned jump was into northern Iraq to secure the area. A week prior, all the predictions were that the weather would be horrible on the planned jump night. The brigade commander said this night was it, and they would try to make it work.

So they spent the week studying models, talking to Central Command (CENTCOM) weather forecasters. All the information was basically bad. Twenty-four hours out, Captain Roberts was using primarily satellite imagery to do his close-in forecast predictions.

The weather in his—he predicted that it would be one hour of an opening in this weather system. He recommended, and they accepted, a change in takeoff to match the weather time. The brigade was in flight with 16 C–17s, almost 1,000 troops on the first 10 of them and equipment on the others.

And the ground crew, within an hour of the drop, said the weather was a no-go, 800-foot ceiling and blowing snow. And John, reviewing the satellite imagery and his best judgment, got on the satellite phone, talked to the brigade commander in the C–17, and said it is going to be okay.

Thirty minutes out, still bad. Fifteen minutes out, sky began to clear. The jump happened on time. One hour after the jump, the weather closed back in. John landed the next day in the C–17, and for the Army guys he could do no wrong based on that day.

John heads, as a major select in the Air Force, to Alabama where he will be teaching at Air University at Maxwell Air Force Base starting this June. So space is important. That is just two examples of their role that they have in military planning and operations.

Space also, of course, plays an important role in our economy, homeland security, disaster response, provides the U.S. asymmetric advantages over our adversaries.

I focused on three key areas in my written testimony. The first was to improve the integration of space capabilities across the national security space community as well as with air, land and sea-based capabilities.

The second area is a get-back-to-basics approach to space acquisition. I will talk more on that.

And the third is to ensure the viability and proficiency of our space professionals and the science and technology workforce.

I would like to refer to this chart in the area of space acquisition. My previous 4 years was as the director of defense research and engineering, and in that role, I had the opportunity to look at a variety of satellite systems and review their technology readiness levels and assess some of the problems that they were having.

Our approach going forward is to look at the system production stage, if you will, as starting with more mature technologies and reducing the cycle time of each block in the system production phase.

Leading up to that is the systems development stage in which the technologies are matured and only then do they qualify for entering into the system production line here.

Before that is technology development; again, maturing the technology, testing it as necessary before it enters into a systems development stage. And finally, the foundation is in science and technology block. So, three interrelated but separate stages.

I believe we should reduce the risk, which we are doing, in the system production phase stage, and increasing the risk in the technology development in the science and technology phase.

As we mature technology from one to the next to the next, we also are looking at our people getting those experiences as they work, get some hands-on experience earlier in their career, so that as they become the program manager of the future, they will understand the technology, develop technical instincts, as well as ex-

perience in program management and address some of the issues that we have seen over the last few years.

As an example, in the fiscal year 2007 budget we have Transformational Satellite (TSAT) coming forward as a block one, block two kind of approach. It was noted by, I believe, this committee, most of Congress, GAO, and our own internal assessment, in terms of the technology maturity of TSAT, and many of the technologies to mature—some were not at the level that they would qualify, if you will, for the systems production phase.

Working through the Quadrennial Defense Review (QDR) with the warfighters, Joint Staff identified those requirements that would be important to have at an earlier date, reducing the risk of the TSAT satellite system forming a block one.

What you will see in the fiscal year 2007 budget is that set of mature technologies that now constitute block one of TSAT. It has a reduction from the final system in terms of some of the laser capability. It also has a reduction from the end-state in terms of processor router capability.

They are continuing their technology maturation in block two, and it is our intent, as they mature, to look at satellites three and four. And so the approach going forward on TSAT, as the first, is to reduce the risk in the acquisition process, following many of Tom Young's panel's recommendations.

We also have in the fiscal year 2007 budget an 80 percent confidence level of the budget. We will be improving the systems engineering. General Hamel, commander of Space Missile Systems Center, is also instituting many of these changes. There is more presence of government people in plant, in our programs, going across the board, but TSAT is one example of that.

We also went forward on the ground segment, called TSAT Mission Operations Systems (TMOS), to identify those standards and protocols to help us better define what the space segment will have in it, as we have two contractors continuing to mature the technologies prior to the competition.

So that is an example of this acquisition block approach through the TSAT transformational satellite program.

So in summary, on TSAT, this incremental acquisition—we are reducing the procurement risk and putting initial capabilities in the warfighters' hands more quickly, and we will improve that capability with block upgrades.

I am confident that this program and others will be able to reliably deliver space capabilities needed to fight and win the conflict and prepare us for the future.

Mr. Chairman, I appreciate the continued support of the Congress and this committee to ensure we have what is necessary to delivery vital capabilities to our warfighter. Thank you for the opportunity to appear before you today, and I look forward to your questions.

[The prepared statement of Dr. Sega can be found in the Appendix on page 39.]

Mr. EVERETT. Thank you very much.

Dr. Kerr.

STATEMENT OF DR. DONALD M. KERR, DIRECTOR, NATIONAL RECONNAISSANCE OFFICE

Dr. KERR. Mr. Chairman, Members of the committee, thank you for the opportunity to share my views about the role that the NRO plays in our national space program.

I appreciate that you will include my written statement and will make every effort to briefly talk about a few of the points most important to me and, I hope, to you.

I should temper my enthusiasm by just saying it is rare for the director of the NRO to appear in an open hearing, and I will, of necessity, be careful in some of my answers, as you have already suggested.

Last July, the Secretary of Defense, with the concurrence of the Director of National Intelligence, appointed me as the 15th director of the NRO. And while the job was new, my familiarity with the NRO and its programs was not, since in 2001, I had served Secretary Rumsfeld and the then-Director of Central Intelligence (DCI) reviewing the role that innovative systems in space might play in our national security.

The conclusions reached at that time are mostly valid today, and the sense of urgency, I believe, should be even greater, because we need those capabilities in order to inform both our military leaders and our policy leaders about a number of things that may happen in the world that they would otherwise be unaware of.

And in order to do that, we see two principal missions for the NRO as we look forward in time. One is to be the foundation for global situational awareness. And the second is, in fact, a reality of the work we have been doing for the past 4 years, and that is to provide information to our users on time lines that are responsive to their needs, not time lines that are simply convenient for us.

We can't do this and be responsive without focusing a lot of attention on the ground segment of our systems. And the reason is simply this: You can talk about requirements right up to the time of launch, but once you have launched a space system, you have delivered capability on an orbit, and your responsiveness is in how clever you can be in using the information that you bring back to the ground. And so it won't be a surprise to you to hear that our ground-based capabilities will be as critical as overhead collection in meeting the need for actionable information.

Another important point for me to stress, particularly with this committee, is that we can't work without the strong partnership with our key stakeholders and mission partners. Our relationships with Strategic Command (STRATCOM), the National Security Agency (NSA), the National Geospacial Intelligence Agency (NGA), Homeland Security, military services and particularly the Air Force are critical in helping us meet our worldwide intelligence surveillance and reconnaissance (ISR) responsibilities.

And certainly, one of the most important stakeholders is the United States Congress. And I certainly ask your support as we implement the changes required to keep pace with today's threats.

One item I know of concern to the committee is the nature of the relationship that we have with the Air Force. It is a longstanding cooperative and collaborative partnership that has existed since the

NRO began about 50 years ago. We leverage each other's expertise and resources to meet each of our unique mission objectives.

Space is our common operating environment, not our mission, and so the NRO and the Air Force have intersecting interests in areas such as personnel, mission assurance standards for spacecraft, assured access to space through launch, spacecraft development and providing ways to best support the warfighter.

We have had this long history of collaboration with the Air Force and, in fact, we are working today with Dr. Sega, with General Klotz, General Moseley and others to strengthen that relationship as we look forward.

The reason we need to do that is times have changed. And in fact, our need to deliver near real-time support to the warfighter as well as the policy maker is very much the same mission of real-time support that Air Force Space Command has to deliver to the warfighter and policy makers as well.

And so we are actively working to find ways to better integrate our activities, to recognize the fact that the Air Force provides about 50 percent of the workforce at the NRO. And a major fraction of those Air Force personnel are active duty.

Many of them come to us with great experience and education in engineering and the other disciplines necessary to conduct our programs. They are joined by people from CIA, the Navy, Army and, in fact, I think we have seven different career services for employees at the NRO as a consequence.

But the point is they are united by our mission and they carry it out very well. We think it is an important way for us to contribute on the job to developing the space cadre we need in the future. And I will come back to that point.

Mission assurance is important. You heard Dr. Sega mention it. We, too, have gone to school on the report that Tom Young and Tom Moorman did a few years ago. And we have implemented a number of their recommendations.

I won't enumerate them in time. We may want to come back to some of them in the question period. But in fact, mission assurance or mission success is our highest priority, and we have redeployed our assets and people in order to underpin that commitment.

We also have thrown out acquisition reform, one of the great oxymorons of the 1990's, and have returned to the way the NRO has done business traditionally in the past.

And with the changes that we made last summer in the FIA program, I think we have, in fact, done a pretty good job of resuming the right level of contact with our contractors, the right level of government oversight and presence and will, I hope, provide stability in the future as we take on other challenging programs.

Launch, of course, is another area. We may be the first ride on an EELV from Vandenberg, or we may be second, but the point is we are a joint investor with the Air Force and the EELV.

We care every bit as much as they about mission success, particularly when our payload is sitting on top, and we will be working together to make that launch a success as soon as we are able to have both the launch vehicle and the spacecraft prepared for that launch.

I also wanted to mention something that people don't associate with the NRO, perhaps, as much as they do with some of the other agencies, and that is support to military operations. Following September 11, 2001, we have, in fact, provided a lot more hands-on training for deployed military forces.

We have NRO people deployed to all of the combatant commands. They move out from that and, in fact, we have had forward-based personnel in the Afghan Pacific theater as well, of course, as in Iraq. They are there simply to help people get more from the systems that we have developed and now operate.

We are not there to do their job. We are there to help them learn how to apply these tools to their current intelligence needs in a way that is supportive of the operations they are conducting. We have done a lot of that training in the past year. We have done about 40 training exercises with different commands.

The focus has, of course, had a CENTCOM-centric view of the world, but we have also spent a lot of time, particularly with Pacific Command (PACCOM), STRATCOM because of their global ISR responsibility, somewhat less with European Command (EUCOM), although the focus on Africa brings us there because our accesses can help them in that regard.

Some specific things that are noteworthy. We developed, for example, the blue force tracking capability, which allows commanders to know where our forces are—very critical in the early phases of the invasion of Iraq, and it is something that we were very proud to be able to contribute to that campaign.

Other kinds of tools are a battle space visualization capability so that people managing tactical ISR assets in theater can find out ahead of time what the national assets will be doing, and they can apply, then, theirs more effectively so that they are not redundantly covering targets that the national assets will be picking up.

We have a capability that we have deployed to support human operations in the field. It obviously has an acronym, THREADS. You wonder what that means. It is threat HUMINT reporting, evaluation, analysis and display system. It is a mouthful, but the point is it enables the integration of national technical collection with what HUMINT capabilities are doing. And remember, one of the most important things for HUMINT is the problem of asset validation. Did the asset really go where they said they would go? And at times we are able to provide the kinds of capabilities that allow an answer to that question.

We have a deputy director for military support. He is an active duty general officer from the Air Force. He serves a dual role. Not only does he support military activities from the NRO, he serves as the J–5 on the Joint Staff as well. That gives us a very strong coupling to the uniform side of our Department of Defense.

It is a time of challenge for us nonetheless. I think we are well recovered from where we were on FIA, but we still have to deliver on other parts of that program as well as a number of other challenges, plus continue to operate the systems that we have today.

Just as a factoid of possible interest, we spend about 50 percent of our resources on acquisition, about 20 percent on operations, and the balance for research, development and the other kinds of things we do. So while we are skewed toward the cost of acquiring space

systems, which are expensive, there is a significant component that goes with operations as well as launch and other activity.

I hope that there is an opportunity in the future to share with you some of the specifics of our systems, either by appearing here or by inviting you to visit with us or one of our ground stations.

In the meantime, I will conclude my opening remarks at this point and welcome your questions.

[The prepared statement of Dr. Kerr can be found in the Appendix on page 56.]

Mr. EVERETT. Thank you very much.

General Klotz.

STATEMENT OF LT. GEN. FRANK G. KLOTZ, COMMANDER, AIR FORCE SPACE COMMAND, DEPARTMENT OF THE AIR FORCE, U.S. AIR FORCE

General KLOTZ. Thank you very much, Mr. Chairman. I appreciate the fact that you will place our written statement in the record. I suspect we are probably the one with the half-pound statement that you talked about before.

Mr. EVERETT. General Klotz, I didn't say that at all. [Laughter.]

General KLOTZ. I have had an opportunity to see the other two, so——

Mr. EVERETT. But we are pleased to have you here following in the general's footsteps, and we look forward to working with you.

General KLOTZ. Well, thank you very much, Mr. Chairman, although I will take issue with you. I don't think anyone can follow in that great man's footsteps. And he——

Mr. EVERETT. I won't deny that either.

General KLOTZ. That is right. He was honored at the legislature of state of Colorado two days ago, which I had an opportunity to attend, and he asked me to pass on his warmest regards to you, sir.

It is a great privilege and honor to appear before you, Mr. Chairman, and the other distinguished Members of this subcommittee. I am also delighted to share this opportunity with two great Americans, each a respected leader and acknowledged expert in the space enterprise, Dr. Sega and Dr. Kerr.

I am also proud to represent the nearly 40,000 men and women of Air Force Space Command stationed around the world, standing watch 24 hours a day, 7 days a week, 365 days out of the year.

At this moment, this fully integrated team of active duty, reserve, guard, government, civilians, and contractors are delivering space effects to joint warfighters as well as civil and commercial customers.

Our space professionals accomplish this by planning, operating, maintaining, securing, supporting our nation's Minuteman III intercontinental ballistic missile (ICBM) force. They fly our communications early warning weather and precision navigation and timing satellites.

They monitor the ground-based radars and other sensors that provide early warning and locate and track thousands of objects in space. And they assemble and launch boosters and maintain the ranges for the launch of our satellites.

And finally, they develop and acquire the next generation of space and missile systems to help ensure America's strategic commercial and scientific advantage in space well into the future.

Along with our colleagues in the National Reconnaissance Office and across the entire national security space enterprise, the men and women of Air Force Space Command represent the best and brightest of our nation's sons and daughters, and we have every reason to be proud of them and their service to this country.

Air Force Space Command has witnessed several milestones and made significant progress since this subcommittee last met to discuss our nation's space posture. Over the course of the past year, we deactivated the Peacekeeper intercontinental ballistic missile while maintaining a safe and secure strategic deterrent.

We conducted the 44th consecutive successful launch, which broke a previous launch record set in 1971. We launched the first global positioning system satellite IIR–M, providing additional civil and military signals and increased power. And we provided critical space capabilities, as Dr. Sega said, to the relief operations following Hurricanes Katrina and Rita.

And while we have made good progress over the past year, there is still much left to accomplish. And toward that end, we are focusing on four strategic priorities. The first is securing the space domain and providing space combat effects to the joint warfighter. Second is to maintain a safe and secure strategic deterrent and to pursue new Terrorism Risk Insurance Act (TRIA) capability for the United States and its allies. The third is to make space acquisition a DOD model for acquisition excellence. And the fourth is to provide world-class professional development and quality-of-life opportunities for our people.

These priorities are not only the right direction for Air Force Space Command, but they are also in line with the priorities of General James Cartwright, the Commander of United States Strategic Command. In fact, supporting the warfighter is at the heart of everything we do in Air Force Space Command.

The asymmetric advantage that space provides is a critical lifeline to those who are in harm's way each and every day. For that reason, it is more important than ever to maintain our technological edge.

Today we operate the most capable GPS constellation in history. Additionally, our meteorological space warning and military satellite communications are surpassing expectations both in terms of capability and service life.

They will not, however, last forever. In a sense, we are approaching a crossroads in providing space combat effects for the warfighter.

As the average age of our constellations reach their or exceeds their design life, we must maintain our commitment to the next generation of systems that provide for communications, precision navigation and timing, missile warning and related capabilities, weather, and intelligence surveillance and reconnaissance. These are all essential to meeting the demands that will be placed on the warfighters in the future.

Let me shift gears for just a moment, if I could, to discuss another important aspect of Air Force Space Command's mission, and

that is the operation of the nation's ICBM force. The size and composition of our ICBM force continues to evolve in response to the changing strategic environment.

Following the signing and ratification of the Moscow treaty, Air Force Space Command began the process of deactivating the nation's 50 Peacekeeper missiles in October 2002. In September of last year, we removed the last Peacekeeper missile from its launch facility, ending a proud chapter in our ICBM history.

Now, even though we deactivated the Peacekeeper missile, the ICBM continues to be an integral part of our nation's strategic deterrent. In the words of our Air Force chief of staff, General Moseley, our ICBMs are the backstop of all our military forces. For this reason, Air Force Space Command is committed to ensuring that the Minuteman III missile remains an effective and a viable weapons system through the year 2020. And thanks to the strong support of this subcommittee and the Congress as a whole, we have continued to make steady progress on the propulsion replacement program, the guidance replacement program, and the propulsion system rocket engine service life extension.

We also, since this committee last met on this subject, conducted three successful test launches of the safety-enhanced reentry vehicle which will allow us to deploy the warhead used on the deactivated Peacekeeper ICBMs on portion of the Minuteman fleet.

While space and missile systems continue to provide some of the most cutting-edge capabilities, they would be useless without trained, equipped and motivated space professionals. Over the past 12 months, we have also undertaken several initiatives to enhance the career development of space professionals in the Air Force, but also in the Army, Navy, Marine Corps and the NRO.

The National Security Space Institute located in Colorado Springs now has a two-star chancellor, a reserve associate unit to augment the staff, and a multiservice faculty with representatives from NASA, the Defense Acquisition University and the NRO either on board or soon to join us.

The school will offer courses to more than 2,000 students in this fiscal year with Space 200 and Space 300 as its foundation programs. At the same time, the Space Education Consortium led by the University of Colorado at Colorado Springs, and comprised of 10 participating universities and institutes, both in the United States and one abroad, will serve as our primary source for civilian space-based education programs.

Finally, in November we pinned on the first new space badges which are a powerful symbol of how we are forcing Air Force Space Command for the future.

With your continued strong support in these and other endeavors, I know we can meet the challenges currently confronting the space enterprise and continue to deliver the space combat effects that are vital to the joint warfighter and to the nation.

Again, Mr. Chairman, I am honored to appear before you and this distinguished subcommittee. I look forward to your questions and working with each of you in the year to come.

[The prepared statement of General Klotz can be found in the Appendix on page 66.]

Mr. EVERETT. Thank you very much.

Some housekeeping things here. I have been notified the votes have been postponed until 4 o'clock, so we do have some time to work here.

And let me begin by first saying that I am not going to talk a lot about space cadre. We will have some questions that I will submit for the record. Of course, other members are free to talk about it or submit questions or whatever.

There are some other things that, in the interest of time, that I want to get to. And so I will give you some questions about that and, as I said, other members may want to use their time to talk about that, or they are free to submit questions, either that they choose.

Some of the things that we have been concerned about are the extreme overruns in cost. I think SBIRS-High was supposed to be $2 billion. I think we are currently just under $5 billion. And I think that the target is now that it would be in the neighborhood of $10 billion or more before we get there.

I would like to point out with the new alignment of SBIRS-High I and II, and then, Dr. Sega and Dr. Kerr, if you could talk to us a little bit about the advanced infrared satellite system (AIRSS) and how that relates and may fit into SBIRS-High should it be decided not to go forward with SBIRS III.

Dr. SEGA. Mr. Chairman, out of the Nunn-McCurdy process, the certification that the Secretary made was that we would finish the engineering and manufacturing development (EMD) phase on those first two satellites, GEO–1 and GEO–2, that we would look at the performance, and progress and development of GEO–1 as one of the factors to decide on the going forward in production on GEO–3.

In parallel with that, the current activity, we would look at alternatives for an infrared space system, a IRSS, and we are in that process of looking at the technologies that would be viable to achieve the necessary missions on SBIRS.

We may, in fact, take a similar block approach in terms of SBIRS, in terms of a system that is able to evolve to full capability in time. That is work in progress. We have several studies that are going forward, getting us prepared to engage in the fiscal year 2007 time frame. We, I believe, have roughly $100 million in the budget for the AIRSS program going forward.

Some I think are exiting options. We could provide details on that also offline. But the work toward a follow-on program that is designed with currently available technologies at the maturity level that is consistent with the system production phase. Shorter acquisition cycle times is our approach on the alternative system.

Mr. EVERETT. Well, on the advanced infrared system, I assume that there is an awful lot of lessons learned that we can gather from the current system that we have, from SBIRS-High. Are we incorporating stuff into that, or is it going to be a completely new system?

Dr. SEGA. No. There is certainly some lessons learned in the technology part. But more fundamentally, it is in how we approach this system acquisition itself. And looking at the technologies that are matured, we have gone a long ways in some of the sensor-related work.

We have invested a number of years, and they are in the later stages, if you will, of the systems development that would be appropriate then to look at the systems engineering and integration into a full system.

So I think technology has moved a great deal in the last 10 years, particularly in these sensing areas, and I believe that a simpler systems design is possible. With technology that has evolved, it would be mature at the time that we would decide to integrate it into a full system.

So it is more of an approach to acquisition from the SBIRS program. We will once again start with mature technologies, incorporate good systems engineering, design for test stability, design for modularity, design for it to be upgraded in time, have more people in the plant, achieve standards in those things that are part of the back-to-basics approach.

So I think the lessons learned is the approach to the design and build.

Dr. KERR. If I might just supplement what Dr. Sega has just told you, I can tell you that the NRO is working closely with the Air Force to share information, capabilities and developments that we have invested in over a number of years.

Another piece of this is that while SBIRS as construed really fit a Title 10 mission, at the NRO you see both the Title 10 and Title 50 authorities and responsibilities. And so while there is the launch warning and assessment mission that is absolutely number one, there are also missions that relate to battle space characterization, technical intelligence and, perhaps, support to the Missile Defense Agency (MDA).

And so one of the things we are trying to do is be the method by which some of these other needs are brought to the table as the different technical approaches are discussed.

And so in doing that, we are working very closely with the Air Force, not to skew it into a great, complicated platform and system, but to see how much of the mission, in fact, each of the proposals might deal with.

Mr. EVERETT. Also, the committee has a great interest in some of the problems that you are facing concerning, for instance, personnel. And I know you are in discussions, so would you describe the situation as it exists? As I understand it, we have got one pot of folks, and we have great need in two different locations.

And I know that you are working hard, and I am not asking you to say how you are trying to solve that. I would like for you just to describe the situation.

Dr. SEGA. Sir, I will take a shot at that and hand it off, because I think there is pieces of it that are important to bring forward from each perspective. As it turns out, Don Kerr and I co-chaired a national security research and development subcommittee during our previous jobs.

We have been working on science and technology and workforce related issues for about four years now. And one of those areas that came out of our work on that subcommittee that then was sent up to the National Science and Technology Council was the need for a workforce for particularly critical skills for clearable people.

Some of the work on the interagency, which we led not just our own organizations but others in government, identified also areas that they would see as people retired needing, you know, additional support.

And so a longer-term answer is a—and we have taken the first couple steps as a more proactive way of getting additional people that are clearable to pursue studies in math, science and engineering.

The national defense education program was submitted last year and approved by Congress in its entirety and this year it is coming forward at roughly double the requested funding from last year, to look at a mechanism of starting to increase the pipeline—math, science and engineering—at the undergraduate and master's and PhD levels, as well.

We also have several forums set up to look at this problem, not only in space, but the broader community. One of those in the space area is the Space Professional Oversight Council. We co-chair that, and we look at the status of our space workforce, and we look at methods of helping with that.

One of the initiatives that was from General Lord was the National Security Space Institute. I have had a chance to be there. I think Dr. Kerr actually has taught one class in there. And I will let General Klotz talk more about the efforts, once people are in our programs, to enhance their knowledge of space.

We are looking at a method of helping manage this precious career field and the people that are in it. As chief of staff, General Moseley has stated the number of people in the acquisition area in the Air Force—and I believe it applies a little more broadly—needs to increase.

And so we are looking at increasing the talent in the acquisition workforce and focusing on the experiences they will get as they mature in time as part of the answer to your question.

General KLOTZ. Sure, if I could, Mr. Chairman, as Dr. Sega said, General Lord took a number of initiatives when he was the commander of Air Force Space Command to broaden the entire look of space professionals.

And we have meticulously, in the last year or so, gone through and identified all the folks who fall into what we would call the credentialed space professional pool to include not only operators but acquisition professionals, and including folks not just in the Air Force but also in the other services and the NRO. So we have identified each of those individuals. We track them on a sheet like this, which happens to be my sheet, that lays out the duty history of each individual who is one of the slightly less than 10,000 people who are being tracked.

In addition to that, one of the things that we have done between the NRO and Air Force Space Command is we now have joint squadron commander selection boards where, as we are choosing the candidates for squadron command in Air Force Space Command squadrons, we are also reviewing those eligible NRO members not only to command our squadrons but also to be used by the NRO in like positions.

In addition to that, at the colonel level, NRO members are also considered by a central Air Force board which identifies those officers who are best qualified to command at the colonel level.

As Dr. Sega pointed out, at the National Security Space Institute in Colorado Springs, we have NRO students but, in addition to that, NRO guest lecturers and, as I said, a member of the faculty soon to join us.

We also talk on a number of occasions, Dr. Kerr and I have chatted on the telephone about the assignment of one individual or another individual to a particular position, and have always come to amicable outcome in terms of the best place to put that person both for the Air Force, the NRO and the broader national security space enterprise.

And as you indicated in your prefatory remarks there, we are in the process of discussions now about how we continue to work the personnel issue. Probably the biggest single issue facing us is balancing experience levels across the workforce.

As General Hamel, who is sitting behind us, would tell you out at Space and Missile Systems Center (SMSC), he has a lot of young lieutenants and captains who are performing duties out there in the acquisition field. He would like to have more experienced and more senior acquisition specialists at SMC, so we are talking about ways in which we can balance this workforce across the entire space enterprise.

But those discussions are still ongoing, and we will be happy to let you know what the outcome of those are when we complete them.

Mr. EVERETT. Mr. Kerr.

Dr. KERR. I think it has been generally well covered. One of the things we have done is tried to accommodate our civilian workforce and track them in the same manner that space command has done with their military personnel.

One of the advantages we have is that we have a significant civilian component to our workforce. They tend to be with us for a greater part of their career, and they provide us the momentum or, if you will, the flywheel as we also contend with the shorter average military tour of duty with us.

The kinds of things that we are talking about include ways in which SMC, for example, could have similarly well qualified career civilians to help them in the same way that we have come to experience that and see value in it.

I think the most important thing to tell you, however, is that the chief of staff, General Moseley, has himself taken a deep interest in our working through this, to the point where he joined us just a week or so ago in discussion on the way we would create the trade space for decision.

He handed the responsibility to General Klotz and others of us are supporting him and working through that. We look forward to the conclusion and reporting to you.

Mr. EVERETT. Thank you very much.

Mr. Reyes.

Mr. REYES. Thank you, Mr. Chairman.

Gentlemen, the operationally responsive space program was created by DOD's Office of Force Transformation, basically to create a new business model for developing and employing space systems.

The aim was to rapidly deliver to the warfighter low-cost, short-term joint tactical capabilities defined by field commanders, capabilities that would complement and augment national space capabilities.

ORS would also serve as a test bed for the larger space program by providing a clear path for science and technology investment, enhancing institutional and individual knowledge and providing increased access to space for testing critical research and development payloads.

The questions I have are the following. According to a recent GAO report, as I stated in my opening statement, the future of TacSat program is in danger because DOD lacks a department-wide strategy and leadership for implementing efforts in this very critical area.

So what actions can you point to that will assure the committee of DOD's commitment to the transformational concept of operationally responsive space (ORS)? And if additional funding were made available for the ORS program, what would be your highest priorities for spending that money?

Dr. SEGA. Congressman Reyes, if I could step back a bit historically, prior to August 4th of last year, I was director of defense research and engineering. And one of the three initiatives that we had in the Department of Defense overall was that of the national aerospace initiative.

And it had three pillars, high-speed hypersonic space access and space technology. And space access was the emphasis providing new technologies, a new way of accessing space. And the focus was on the small side, the small launch vehicle.

In the space technologies, if you are going to be responsive with respect to the booster, you also need to be responsive with respect to the satellite. Once it is on orbit, you need to design it such that the checkout time is reduced, the time to do the confirmation systems are working, the out-gassing and so forth should be minimized.

We worked hard on that. I worked with Admiral Cebrowski throughout that period of time, and DARPA was part—Deputy Director Research & Engineering (DDR&E)—and engaged in the Falcon program, a joint effort with the U.S. Air Force.

As to the Falcon program—space on the small launch vehicle was founded and began its work. They had four competitors, and now there is, I believe, currently two within the next phase, and if the others proceed up they may also join them. So that is on the launch side.

On the spacecraft side, we are looking at the overall strategy, as you have pointed out, that is important. But we are doing it in a little different way. We are looking at it in terms of small sats on the satellite portion.

One portion of that small satellite family would be TacSats, the tactical support to the tactical commanders. So there is a new need for some reason and you need go on quickly.

The next area is smaller satellites that could form the role that we need 24/7, a normal part of the constellation, if you will—space-based surveillance system may be part of that smaller satellite. We may have an opportunity to look at a smaller sat application as we talked before about the AIRSS program.

Small sats have a role of filling our needs in a 24/7 global constellation in addition to the TacSat for a new need for the tactical commander.

In both cases, an operational responsive system could provide the reconstitution capability both for TacSat as well as for small sat in their constellation.

The third area is in this grouping in the second and third lines of systems development and technology development. We may need to fly a small sat with some of that technology on board to do the technology maturation to move a technology, say, from the development stage into the systems development.

And it would benefit from a ride on a small sat and do the work in space. And the fourth area is more exploratory work in science and technology.

So we are forming the strategy of the small satellite value in many areas, I believe, going forward to the Department of Defense in space. One of those would be TacSat. So I believe that is an important component.

General KLOTZ. Dr. Sega gave a very comprehensive answer. I would just add to that that while, on the one hand, we recognize the great value and contribution that our large constellations of GPS satellites, communications satellites, national systems contribute to the warfighter, we in the Air Force, under the leadership of our previous chief of staff, General Jumper, and our current chief of staff, General Moseley, recognize that there is a need on the part of the combatant commanders, the theater commanders, to have capabilities that might be delivered from space in a much more rapid turnaround time than it takes to develop some of these larger constellations in order to augment their capabilities in terms of communications or intelligence, surveillance and reconnaissance.

So from a military perspective, this is a very important and very intriguing and, at the same time, very challenging way to provide that kind of capability, to be able to turn the capabilities both in terms of the launchers for these types of systems, the satellites themselves, and equally important and sometimes overlooked, the command and control of those particular satellites once they are up and on orbit.

Mr. REYES. And the prioritization should there be additional funding? Would it be divided, or it would be proportional, or——

Dr. SEGA. That would be part of our study going forward. I believe it should have a greater role in our look forward in space, and so we are in the process of reviewing and going through the initial parts of our fiscal year 2008 budgetary process, and so that has already been an area of discussion, so I would look at that as having a more prominent role as we go forward.

Now, each of the services have needs, and the ground component may need augmentation from comm, and that may be from an Army, you know, derived—or CENTCOM or other combatant commander-derived need.

And so we are—because we have the participation of the Army, Navy and Air Force, and there are many technologies that also are similar in value to NASA as well as the NRO. So we are doing this more in an across-the-board look at how we bring the technologies in the small satellite to greater capability.

TacSat–3, for example, being done in Albuquerque today is a very modular approach to the development of the satellite, so it would provide many of those flexibilities and that sound engineering and agility to accommodate various payloads within the design of the bus for future application potentially across the board.

Mr. REYES. I guess the other question that comes to my mind as a result of this multilayer strategy that you have set out is operationally, what lessons have we learned, again, I guess, from the experience particularly in the Middle East the last two and a half years, three years, the requirements for capabilities to respond on a short-term basis to other emerging threats? Would that impact the prioritization even as you have described it?

Dr. SEGA. I think it would be a factor, yes, in the discussion that goes forward, but we are also looking at how that satellite, for example, would fit into other capability, whether it would be enhancing other satellite systems as well as enhancing potentially our airborne assets, as well as potentially those on the ground.

So how that would fit and potentially leverage other assets in space as well as air and ground, and so it would be a larger and a holistic look at the solution to a problem.

Mr. REYES. And if we are getting into an area that we shouldn't publicly, please let me know, but what I am trying to get at is not just the coverage but the capabilities that would be required based on lessons learned particularly in the Middle East, but also given the threat and, I guess, the composition of what combatants on the ground would require.

I don't know if I am explaining this correctly, but if there is a requirement in a particular area, and we know we have got coverage for force protection purposes to the Middle East, the—what I am trying to understand is if we provide additional resources, is there a prioritization of those kinds of capabilities based on the requirements?

You know, it could be something like a launch out of a place like North Korea. It could be something like a new emerging threat out of Iran for both for our forces or, perhaps, one of our allies. Is there thought being given to the kinds of capabilities that purely the small satellites and the tactical satellites bring to bear tactically in those requirements?

Dr. SEGA. Let me try and then maybe hand it off to either here. I think what——

Mr. REYES. And if you are not comfortable—if we are getting into an area in terms—because I realize the chairman and I sit on the intelligence committee, and I know there are times when we shouldn't speak publicly about some of those capabilities.

But the bottom line that I am trying to get at is that we do have a prioritization based on lessons learned, based on potential threat, and based on maybe even the unknown, because we are dealing in a realm here where——

Dr. SEGA. Right.

Mr. REYES [continuing]. You know, Iran, North Korea—who knows——

Dr. SEGA. Yes, let me try it——

Mr. REYES. Okay.

Dr. SEGA [continuing]. And see if—and then I will ask for some help here. But I think we have begun working the acquisition community closer and closer with the warfighters.

Our forums that are including General Cartwright on nearly all of them in terms of whether it be a space partnership council or a stakeholders meeting to understand what space can provide—I was with Undersecretary of Defense Ken Krieg yesterday and he asked when the next stakeholders meeting was going to be, to see if they could get up to what space capabilities would be provided.

But they are a critical part of helping determine what our priorities are. And so it is the dialogue that is important. So when we ask what they need, they are also asking what do you have. And so it is that discussion back and forth that is very useful.

For example, and it is a larger sat example, obviously, but TSAT—in arriving at block one to the Quadrennial Defense Review process, and with the warfighters, we have reduced some of the laser communications capability, but we increased by a factor of three, I believe, the K.A.-band R.F. communications capacity on the first block of the TSAT satellite.

And so the trade space was done with the user, with the warfighter, to determine what technically should constitute a block one. I believe a very similar process, though fast in this case, would be done in terms of what would be needed in the small sat arena.

And I would turn it over to see if General Klotz or Dr. Kerr would have comments.

Dr. KERR. Because you also have participated with the House Intelligence Committee, I think you're familiar with the national intelligence priorities framework. And we have briefed you on that. And one way to think about the way we go and test our ideas about new capabilities—on the policy side, we tend to start with that framework and then work through to specific suggestions.

On the support to military operators, we are driven by inputs from STRATCOM, from our deployed people in the field working with the command, and of course our connection to the Joint Staff, which gives us another visibility.

And what we try to do is deal with issues of access, timeliness, precision location, acquisition, discrimination—what are the attributes that are needed in a system that we might develop in the field. And so we have the two different frameworks, because to some degree the support to operations is a different part of the business than the support to policy makers.

In operations we don't distinguish actually today between the military operator or an intelligence operator. Their needs for timeliness and accuracy are just the same. But it is the timeliness that really characterizes the support to operators as distinct from some of the support to policy makers.

General KLOTZ. If I could add something, sir, we have, as Dr. Sega pointed out, been working very, very closely with the other services to determine what their needs are, what their priorities are. We are doing this in Air Force Space Command under a pro-

gram called joint warfighting space. And I will talk a little bit more about that in a moment.

But we have worked closely with the Army. We have worked closely with special operations command. And we are currently very much involved with an exercise called joint expeditionary forces experiment, or JFEX, which is testing out some of these concepts that I talked about before, particularly the command control aspects of it.

And I think I can safely say that there are to be two areas that our warfighters are telling us that they might like to see additional capabilities or augmentation, and that is in the area of communications, particularly beyond-line-of-sight communications—if you are running a convoy in Iraq, or you happen to be in a mountainous area and you can't communicate directly because of the mountain that is between you and who you want to talk to.

The other area is intelligence, surveillance and reconnaissance, but we probably should leave that to another setting.

Now, a lot of these capabilities, particularly in the area of communications, again, are met by some of our larger systems. The military forces—Army, Navy, Air Force, Marines—do need a lot of bandwidth. They do need a lot of throughput in terms of communication. They need communications that are both secure and protected that can't be easily jammed by an adversary.

And so that is why, as we work through some of the follow-ons to the defense satellite communications system, the DSCS satellites, as well as the MILSTAR satellites, that is why we are increasing bandwidth, increasing capabilities, increasing throughput to do that.

But there still may be a need for a simple, low-cost, low-weight radio repeater that could provide that sort of beyond-line-of-sight capability within the theater for a particular mission on a particular day.

We are approaching this from two directions. I should add that it is not only operationally responsive space, but we are also looking at platforms that can operate in the regime between where aircraft normally fly and where satellites normally orbit, that regime between 65,000 feet and 300,000-plus feet.

So we are doing some work again with these same partners, Army, special operations command, to look at balloons or winged vehicles that can again provide those kind of capabilities, not to replace what is on orbit, and not to replace what is provided by aircraft operating closer to the earth's surface, but to complement and to augment those capabilities for a particular type of mission.

Mr. REYES. Very good.

Thank you, Mr. Chairman.

Mr. EVERETT. Mr. Spratt.

Mr. SPRATT. Thank you all for your testimony. I think you would agree that we are beginning to see the defense budget tighten. You can see it in your own Air Force budget—the C–17, where the system will probably be stopped at the end of its current production run.

The F–22 is down to 179 airframes now, which is minimally adequate. There will probably be further reductions in the F–35. Looking at that, you have got a budget here that seems to be going in

the opposite direction. It seems to be growing as opposed to shrinking.

And I guess that is one concern we have about the potential for overruns, because the history of these systems shows that they are prone to overruns. On the space-based radar in particular, I think last year's estimate for the nine-ball option was $34 billion. That was life cycle cost.

Can you make the case for the space-based radar in light of the fact that it can't be used easily in urban areas due to clutter or in rural areas due to foliage and things of this nature? Is it worth $34 billion in light of the things we are having—the tradeoffs we are having to make elsewhere in the Air Force's budget?

General KLOTZ. Let me start. I will make the military case for it, and I will let Dr. Sega make the business case of that.

The military case—if we go back and take a look at the last two major conflicts in the Gulf region, one of the great advances was the moving target indicator capability provided by the Joint Surveillance Target Attack Radar System (STARS) aircraft, where you actually had the ability to watch convoys at night, in the dark or in dust storms, moving down and approaching our forces as they were moving up into Iraq.

That type of capability was, in some sense, transformational. Now, the problem with that in any future conflict is you may not be able to move an aircraft into a denied area or a closed area in order to provide that type of moving target indication to the ground commander or the air commander.

So the ability to have a platform that has greater persistence and can provide you that kind of capability in a denied area is one which is of great interest to the theater commanders.

Dr. Sega has gone around and talked to a number of our combatant commanders, and universally they have said this is the capability which they need.

Dr. SEGA. And in particular, we visited PACOM, STRATCOM, NORTHCOM, SOCOM and CENTCOM and asked them precisely the question you have asked. I think it is important to view it in the context of how it supports our capability in space and, again, with airborne and surface-based platforms.

And it is that leverage that it would provide if there is a moving target indication similar to Joint STARS, as General Klotz just pointed out, then you are using other assets in a very effective way, because you know where to go, because you have been tipped off by the moving target indication function.

Open ocean surveillance ends up being more and more important. From PACOM and the Joint Staff and NORTHCOM, the ability to look over vast regions ends up being more important.

Mr. SPRATT. When we had SBIRS-Low and its previous configuration, one of the characteristics of SBIRS-Low was to be battlefield characterization. That was typically listed as for—was sort of a lagniappe, because the transformation had nothing to do with that, but the idea would be that the tactical user would be able to tap the system and bring tactical battlefield characterization and information down where it could be used.

That particular type of interaction between the tactical user and the satellite was eventually dropped from SBIRS-Low. As you read

the description, as I understand it, of the space-based radar, while it will give you moving objects, you won't be able to distinguish with great resolution among those objects.

And picking up one object and following it might be okay, but you may not be able to tell the difference between a garbage truck and a tank, as I understand it.

Dr. SEGA. The details of the capability we are looking at in space radar is something we can present at a different forum.

But the technology going forward—we have been building electronically arrays for decades now and they are in our F–18. They are in the F–22. They are going to be in the joint strike fighter. So we have made a great deal of progress in terms of our knowledge of and use of radar.

Space-array radars go back to, you know—and before in terms of where we are at. How they fit in and their value added is going to be also done through this process that we arrived at at TSAT.

Currently, Admiral Giambastiani and the Joint Staff, through the cocomms are looking at what would constitute a block one space radar, and how does it fit and add value into the total warfight.

And so we will be working closely with them as we go forward and mature the technology.

Mr. SPRATT. The light is buzzing there, but could I ask——

Mr. EVERETT. Go ahead, John.

Mr. SPRATT [continuing]. One last—switching to a totally different subject area, and that is all of these systems—the payload are extremely expensive and, as I said, prone to cost overruns. But there is another expensive aspect, and that is lift.

And over the years, the Air Force has sought to reduce the cost of lift, but it has proved to be an elusive goal. Could you tell us where you are with respect to your efforts to reduce the cost of lift? I understand it takes about $22,000 to lift a single kilogram into orbit presently.

Dr. SEGA. I will answer it in two areas and maybe turn it over as well. We recognized the issue in the 1990's and expended money toward the development of the evolved expendable launch vehicle, EELV, and we have systems now that the development cost and the launch costs are reduced from what we had before.

It is still expensive. I understand that. But it is more common interfaces and so forth between the EELVs, the Delta Force and Atlas 5s. We are also pushing on the smaller side.

I think there is a lot of opportunity, as Congressman Reyes pointed out, in terms of pushing operational responsive systems or just lower cost launch access to space. And so that is in a parallel program that the department has been engaged in for a number of years.

But cost to orbit and reliability and mission assurance to orbit is critically important.

General KLOTZ. I wouldn't add anything, except just to underline Dr. Sega's last comment there, that, of course, mission assurance and mission success are absolutely critical to doing that. And as I stated in our opening statement, we have had 44 successful launches in a row which ties the all-time record back in the early 1970's.

So it is something that is a difficult, complex task in undertaking, and there are some expenses associated with that, costs associated with that.

But as Dr. Sega said, with the current family of vehicles under the EELV program, and the exploratory work—the demonstration work that is being done on some smaller things, the hope over the longer term is to drive down costs and to, at the same time, maintaining assured access to space.

Mr. EVERETT. Do you have another question?

Mr. SPRATT. One more question, just a comment on a question. You sit here 23 years, you see things come and go in cycles and things like that.

You remember General Abrahamson, of course. A key component of his trying to make the space-based elements of Strategic Defense Initiative (SDI) affordable was to bring launch costs down by an order of magnitude, which we aren't even close to approaching.

And there were specific programs to do that, so I was just observing it seems still to be a very difficult goal to attain. I guess that is a fair summation. Could you tell us what you can on the open record about space weapons, space counter-space? Maybe you can't tell us much on the open record.

Dr. SEGA. I would prefer to take that for the record.

[The information referred to can be found in the Appendix beginning on page 102.]

Mr. SPRATT. Okay. That is fine. I am sorry we couldn't get together yesterday, but I appreciate your diligence. We will do it again some time. Thank you very much.

Mr. EVERETT. John, we are going to have a closed hearing——

Mr. SPRATT. Yes, okay.

Mr. EVERETT [continuing]. Briefing on it later.

Mr. Larsen.

Mr. LARSEN. Thank you, Mr. Chairman. I apologize for being late.

I am assuming from the acquisitions stages block approach that you have addressed some of the just general questions about acquisition programs in space and the concerns expressed last year and over the year about cost and so on.

And I don't know if this refers specifically to TSAT, but can you describe the status of the program on TSAT? And can you give us, say, over the next 12 months what are some key events that will exist in the TSAT program that will give us here in Congress some ability to measure the progress and gain some confidence in that program?

Dr. SEGA. I will try to do this from memory and, you know, I will follow up with more details.

[The information referred to can be found in the Appendix beginning on page 107.]

Mr. LARSEN. Sure.

Dr. SEGA. But the TSAT program, as was observed not only from Congress and GAO but our own internal work, had parts of the program that were doing well with regard to maturing of the technologies and some that were a bit behind.

And in looking at that and working with the warfighters, identifying what is needed when, we developed, you know, the block one,

block two approach. And those technologies that we deem that would be best served in a later block include some of the higher-end laser capabilities as well as the advanced processor router.

We will still have a router. We will still have laser comm. But it won't be at the sophistication as was originally envisioned.

Now, over the next 12 months we will have a number of demonstrations and tests that demonstrate that the technologies in block one will be at the T.R. level six by next February 7th. So we are on a track to—there is a couple, and I believe one is laser and one is the router, that are at five, and we are on a path to move them to six.

And the first phase should be completed in the next few weeks that assures that we have confidence, you know, at this earlier stage. So that is part of it.

The other is in systems definition, look at the ground segment requirements review. We let the contract for TMOS here in just the last few weeks, but in the next few months have that definition of systems requirement. That will actually help define the space segment.

We will look at the standards and specifications required in the space segment and see how much that we can actually do on the ground segment and how it interfaces with the rest of the global information grid.

So the next milestone down about a year from now will be an overall system design review for TSAT, so that takes us out to April 2007. And with that is the space segment system design review, also April 2007.

And then looking at, if everything works out with regard to the technology, at a space segment RFP released around May of 2007.

Mr. EVERETT. Rick, I would appreciate it if—we have covered——

Mr. LARSEN. Yes, sure.

Mr. EVERETT [continuing]. And in the interest of time and the other members' time, I would appreciate it if you would——

Mr. LARSEN. Yes.

Mr. EVERETT. I appreciate it.

Mr. LARSEN. Yes, will do.

Mr. EVERETT. John, do you have something else?

Mr. LARSEN. I have got a——

Mr. EVERETT. Go ahead, I am sorry.

Mr. LARSEN. Yes, sure. No, that is fine.

Mr. EVERETT. Just as long as it is some things we have not already covered.

Mr. LARSEN. Sure, I appreciate that. No, I am sure you haven't covered this.

I was in China in January with a couple other members, and we were the first foreign delegation to be allowed to visit the Jiuquan Space Launch Center out in the middle of nowhere, in the Gobi Desert, which actually, by the way, you get better cell service there than in some places in my district. And we were able to visit the launch center, visit the vehicle assembly building, and then go out to the launch site as well, and—able to take some—they allowed photos. There was some information that, you know, we passed on.

And one thing that they communicated to us—and in the interest of good relations we said we will pass it on, but that is as much

as we can do and will do—is their express interest in cooperation with the U.S. on space. Obviously, there is a lot of concerns in that regard.

And I guess one message that we took away from that is they are cooperating with Russia, with Brazil, with seven countries in south Asia and, of course, with the European Space Agency.

The basic message is they are certainly not waiting for cooperation with the United States as they move forward on their space program. That is the pretty clear message that they wanted to communicate to us. And I don't know where this is all going to lead. I know the NASA director is headed over there at some point to generally talk. But I just wanted to make you aware of that, some information you will pass on to your offices, so at least you have that. Maybe it is something you already have, but we will pass that information on to you. Use it how you will. Yes, thank you.

Mr. EVERETT. And, Rick, I thank you for your cooperation with the chair.

Gentlemen, we have a number of questions for the record that we are not going to be able to get to today. And I would appreciate a prompt response to those questions, and I am probably talking 30 days rather than Washington time of whenever. So as soon as you get it back to us I would appreciate it.

John, if you have nothing else—Mr. Schwarz? How did we time that?

Thank you for your participation here today. We look forward to moving through the markup session, and we will probably have more conversations particularly in the closed briefing that we will have later. Thank you again.

The hearing is adjourned.

[Whereupon, at 2:33 p.m., the subcommittee was adjourned.]

A P P E N D I X

MARCH 16, 2006

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

MARCH 16, 2006

Opening Statement
Honorable Silvestre Reyes
Hearing on
Fiscal Year 2007 Budget Request for Space Activities
Subcommittee on Strategic Forces
House Armed Services Committee

March 16, 2006

Mr. Chairman, I join you in welcoming our distinguished witnesses, Air Force Under Secretary, Dr. Ronald Sega, NRO Director, Dr. Donald Kerr and Acting Air Force Space Commander, Lt. General Frank Klotz. I want to thank each of you for your service to our country, and for taking the time to be with us today.

Our witnesses will present highlights of the Fiscal Year 2007 budget request for space activities. Space systems afford extraordinary benefits to our troops in combat and are increasingly integrated into the fabric of our weapons systems and military operations.

It is hard to overstate the importance of space systems to our troops on the ground, or for that matter, to each of us in our every day activities. We have all seen the pictures of precision guided munitions that depend on GPS signals, and

most of us have purchased gas using a credit card that was authorized through a satellite communications link.

Yet our ability to exploit the benefits of space is threatened by two trends. First, as Chairman Everett has often reminded us, the cost of developing and launching satellites has literally skyrocketed. Second, space is increasingly seen as a potential battlefield.

The committee has been concerned about both of these trends. Last July, our subcommittee held a hearing devoted to exploring space acquisition problems and, during the fall, the Committee's Defense Review Threat Panel held an unclassified hearing on Space Security and took a classified briefing on space threats.

Within the limits of what we can discuss publicly, I hope that the witnesses will address both of these trends during the hearing today. How can we improve the acquisition system needed to maintain and improve our space capabilities? And what can we do to improve the security and awareness of our assets on orbit?

To set the stage for the discussion of acquisition improvements, I would like to remind our witnesses of a key finding in the testimony of the Government Accountability Office before our subcommittee last summer:

> **"Overall, we have found that DOD has been unable to match resources – technology, time, money – to requirements before beginning individual programs, setting the stage for technical and other problems, which lead to cost and schedule increases."**

Specifically, GAO found that:

- **Satellite requirements are either inadequately defined at the beginning of a program or changed significantly once the program has begun;**
- **Technologies are often not mature enough to be integrated into a final product; and finally,**
- **Cost estimates are therefore unreliable.**

GAO also concluded that "DOD starts more programs than it can afford, creating a set of incentives and pressures that invariably have negative effects on individual programs and the larger investment portfolio."

While I commend Dr. Sega and Dr. Kerr for taking steps to revise the acquisition strategy for key systems including

TSAT, SBIRS-High and FIA, the subcommittee has been concerned that we are biting off more than we can chew in space systems development. For that reason, Congress has slowed development of selected systems through the budget process. The Department, the intelligence community, and the Congress must work together to put our national security space programs on an affordable, sustainable track.

One promising approach to improving space acquisition practices is the "TacSat" or Operationally Responsive Space program. This program was created to rapidly deliver to the warfighter low-cost tactical capabilities and to stimulate the development of a new business model for developing and employing space systems.

I believe that, if properly funded and supported, this program can serve as a test bed for the larger space program by providing increased access to space for testing critical research and development payloads. And while physics and mission requirements preclude certain roles for TacSats, I hope our witnesses today will discuss how we might mix TacSats with larger, more expensive systems, in an overall

architecture that simplifies the mission of individual satellites and results in a more affordable solution to meeting our needs.

Unfortunately, a recent GAO Report on the TacSat program, commissioned by our chairman, Mr. Everett, found that: "DOD lacks a department-wide strategy and leadership for implementing efforts in this area. Because key advocates of the experiments have left DOD, it is unclear how well the experiments will be supported in the future."

I hope the witnesses will speak to this issue today, and that the Department will allay concerns about the DoD's commitment to this program in its response to the requirement in section 913 of the FY 2006 Defense bill to prepare a report providing a plan for the creation of a joint program office for the TacSat program.

As to the second trend – space as a potential battleground: While I understand that raising questions related to threats to our space assets potentially opens up a can of worms, Mr. Chairman, I believe that members from both sides of the aisle can benefit from an unclassified discussion about our interest in assuring both our commercial and

military use of space. Space is not your traditional battlefield. We need to understand the shape of this terrain, potential threats to our space assets and the need for increased awareness of space activities.

I appreciate the fact that these issues are difficult to talk about in open session, but much has been written in the unclassified literature on these subjects. To the extent that they can, I encourage our witnesses today to address unclassified aspects of these issues in their testimony today.

Mr. Chairman, I also want to thank you for scheduling a closed briefing on these issues next week.

Finally, Mr. Chairman, I want to thank you for calling this important hearing. We have much ground to cover, and I look forward to hearing from our distinguished witnesses. I yield back the balance of my time.

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE HOUSE ARMED SERVICES COMMITTEE

UNITED STATES HOUSE OF REPRESENTATIVES

SUBCOMMITTEE ON STRATEGIC FORCES

SUBJECT: SPACE POSTURE

STATEMENT OF: HONORABLE RONALD M. SEGA
UNDER SECRETARY OF THE AIR FORCE

MARCH 16, 2006

NOT FOR PUBLICATION UNTIL RELEASED

BY THE ARMED SERVICES COMMITTEE

UNITED STATES HOUSE OF REPRESENTATIVES

INTRODUCTION

It is my distinct honor to appear before the Committee today to discuss our National Security Space activities as Under Secretary of the Air Force and Department of Defense (DoD) Executive Agent for Space. As the DoD Executive Agent for Space, my role is to "develop, coordinate, and integrate plans and programs for space systems and the acquisition of DoD space Major Defense Acquisition Programs to provide operational space force capabilities to ensure the United States has the space power to achieve its national security objectives."

The President's Budget, released on February 6, 2006, "focuses taxpayer resources on National priorities like the War on Terrorism, health care, energy research and strengthening our global competitiveness," and includes defense spending to "maintain a high level of military readiness, develop and procure new weapon systems to ensure U.S. battlefield superiority, and support our service members and their families." This budget "reflects the Department's continued shift in emphasis away from the static posture and forces of the last century toward the highly mobile and expeditionary forces, and accompanying warfighting capabilities, needed in the century ahead."

As discussed in the Secretary of the Air Force's and Chief of Staff of the Air Force's testimony in the 2006 Air Force Posture Statement, "The U.S. depends upon the Air Force to supply critical space capabilities to meet the needs of Joint operations worldwide, and also the needs of national missions across the instruments of diplomatic, informational, military and economic power." These space capabilities enable the U.S. to assure allies, dissuade military competition, deter threats and decisively defeat adversaries. The National Security Space community must address the 21st Century defense challenges by "modernizing critical capabilities across the spectrum of

global strike, navigation, weather, communication, missile warning, launch, surveillance, counterspace and ground-based space systems."

Today, I want to outline the importance of space to our warfighters and then focus on three key areas for national security space. The first is to improve the integration of space capabilities across the national security space community, as well as with air, land, and sea-based capabilities. The second area is to get "back-to-basics" in space acquisition. The third is to ensure the viability and proficiency of our space professionals and science and technology (S&T) workforce.

Before I discuss each of these areas, it is important to reiterate the importance of space capabilities to our nation. Space pervades many aspects of everyday life in America. Space services enter homes, businesses, schools, hospitals, and government offices to affect transportation, health, telecommunications, weather forecasting, education, commerce, agriculture, and energy. Space services are transforming major aspects of commercial and social activity and will continue to do so as emerging technologies increase the satellite capabilities. Our nation's ability to respond to events around the world is heavily enabled by space-based capabilities whether defending our borders, facilitating disaster assistance at home or aiding disaster victims in the Far East.

From a military standpoint, leveraging our space capabilities provides the U.S. with an asymmetric advantage over our adversaries in our fight to win the "Long War," the Global War on Terror. Today's fast-paced military environment requires global connectivity between many fast-moving elements. Satellite communications (SATCOM) is the backbone that connects

forces to allow an intercontinental flow of information whether in remote deserts or crowded urban terrain.

Space-based warning systems help to defend our forces abroad as well as the American homeland from ballistic missile attack. Successful cueing of defensive systems allows timely responses to attacks. This past December, the Under Secretary of Defense, Acquisitions, Technology and Logistics certified and restructured the Space Based Infrared System (SBIRS) High program. As part of the certification, it was determined that this program is essential to national security, there are no other lower cost alternatives, the program cost estimate is reasonable, and the management structure is adequate. The first Geosynchronous Earth Orbit satellite (GEO-1) is now planned to launch in Fall 2008. Given the continued importance of the missions, the Department will work with Congress to initiate a new, competitor capability in parallel with the SBIRS program to ensure that the nation's missile warning capability is sustained and that support to theater and strategic missile defense, technical intelligence, and battlespace characterization is also achieved. This proposed program should exploit new technologies to provide the Department with additional options for making decisions related to these mission areas. The Department will also conduct enhanced oversight of the SBIRS program to ensure that cost, schedule, and performance are closely monitored.

Battle-space awareness, coupled with precision weapons such as those guided by Global Positioning System (GPS), allows our forces to successfully engage enemy targets with a minimal number of weapons and limited collateral damage. In fact, precision strike is no longer just a goal; it is an expectation.

Space-based ISR systems, by providing global presence and increasing persistence, provide data that make it possible for military commanders and national decision makers to lift the fog of war over the battlespace. Detailed information from space systems helps us utilize limited national resources more effectively. Only with space systems can we consistently observe remote or denied areas to help us better prepare for and respond to threats. In addition to military applications, space-related capabilities also help national leaders make foreign policy decisions by supplying key data for diplomatic decision-making, helping verify treaty compliance, and monitoring diplomatic crises.

Future ISR systems, such as Space Radar, will give users more persistent, worldwide, day, night, and all-weather knowledge of enemy movement. When integrated with other space-based systems and terrestrial systems, this additional source of information will provide more robust battle space awareness.

Space capabilities also play an important role in disaster response and homeland security. For example, our weather satellites observed Hurricanes Katrina and Rita and provided data for forecasting their strengths and impacts. After these storms disrupted many normal means of navigation and communication, response teams relied on GPS for precise navigation and used SATCOM to coordinate their efforts. Space-derived data aided the disaster response in many ways to help alleviate the severity of these disasters.

Aside from commercial industries that use space services directly, space has a pervasive economic and social impact. Many banking and financial firms employ GPS timing to synchronize their encrypted computer networks. With the rise of computer-based stock trading

and e-commerce, precise timing of transactions is becoming more important, and GPS is a key mechanism for distributing these necessary timing signals.

Maintaining the asymmetric advantages we enjoy today in space will continue to be vital to U.S. national security in the future. Operations in Afghanistan and Iraq clearly demonstrate that space-enabled warfare is the way we will fight current and future battles. Plans for future military capabilities across the entire DoD reflect this new reality. For example, the Army's Future Combat System will operate in more complex battle environments requiring a mix of manned and unmanned systems connected by a network. To provide global connectivity, that network will rely on space-based communication systems. The Transformational Satellite (TSAT) Communications Program is being developed to support the extension of the Global Information Grid to deployed and mobile users, allowing the warfighter and other users increased agility and effectiveness in dispersed, decentralized and constantly changing environments.

In order to provide continuous, reliable space services, we must ensure access to space. This past year I had the opportunity to witness the final Titan IV launch. Culminating a nearly 50 year history of the Titan program, this launch out of our West Coast facility at Vandenberg Air Force Base, extended a record 44 consecutive successful national security launches. We are maintaining this assured access to space by using the Evolved Expendable Launch Vehicles (EELV) as we simultaneously investigate new Operationally Responsive Space (ORS) launch options.

The Air Force is continuing its pursuit of ORS small satellite capabilities with the potential to rapidly deploy and employ communication, ISR, and other space capabilities. The range of

opportunities for small satellites includes not only rapid response capabilities such as TACSATs, but also development of small satellites as standard elements or backups for global constellation operations, and as enablers for more aggressive S&T and technology/system development programs.

Since space capabilities are so vital to our defense as well as our everyday life, they must be protected. As we become more operationally tied to space systems, future adversaries will try to deny us the asymmetric advantages that space provides us. The Space Commission pointed out in 2001 that the U.S. is an attractive candidate for a "Space Pearl Harbor." We saw the beginnings of this with GPS jamming in Operation IRAQI FREEDOM. While the United States supports the peaceful use of space by all, it has been our nation's policy since 1996 to ensure hostile forces cannot prevent our own use of space, and to counter, if necessary, space systems and services used for hostile purposes, preferably using temporary or reversible manners.

The first step in protecting our space capabilities is improving our Space Situation Awareness (SSA). SSA forms the foundation for all of space control and includes traditional space surveillance, collection and processing of space intelligence data, analysis of the space environment, and the fusion of these elements to contribute to a better understanding of the space domain.

Space control activities also emphasize the protection of our national security interests against potential vulnerabilities and rapidly evolving threats. We are increasing our focus on ensuring our assets will meet operational requirements in a growing and changing threat environment.

Our DoD Space areas of emphasis—integration, acquisition basic back to basics, and workforce development—are aimed at continued access and successful exploitation of space in support of our warfighters.

INTEGRATION OF NATIONAL SECURITY SPACE CAPABILITIES

Efficient operation of on-orbit and ground assets requires integrating space capabilities with other operational military systems and between the military and intelligence communities. While our space systems function well individually, we need them to work together for maximum effect on the battlefield. We have learned from our experience integrating air and space operations into Combined Air Operations Centers (CAOC) that our systems should complement one another rather than compete against each other. The best overall effect should be realized by a mix of integrated systems; combining orbiting platforms with manned and unmanned aircraft, ground-based assets, and other systems, linked together so they share data, and cue one another.

Space capabilities serve the interests of a wide array of stakeholders: the Department of Defense, including the Combatant Commanders and fielded forces; the Department of State; the Department of Commerce; and the Director of National Intelligence and the Intelligence Community. As the DoD Executive Agent for Space, I have had the opportunity to visit five of the Combatant Commands -- PACOM, NORTHCOM, STRATCOM, CENTCOM and SOCOM--to discuss first-hand their needs and requirements. I also work with the Joint Staff and the Army, Navy, and Air Force space components to gain similar insights. Through on-going interaction with the Defense space acquisition community, government laboratories, DARPA, Federally Funded Research and Development Centers (FFRDCs), industry, academia, and the

Director of the National Reconnaissance Office (DNRO), we are enhancing links between the warfighters and the acquisition community. In particular, the activities of the DoD Executive Agent for Space and the DNRO, Dr. Don Kerr, must be coordinated. I assure you that Don Kerr and I work closely together to provide continuity and focus to the overall National Security Space portfolio. This is especially important as we consider the need to improve planning, development, acquisition, and management of our space capabilities.

The government relies on a robust space industrial base to provide the systems, technologies, and services necessary to maintain our space capabilities. A good example is the commercial SATCOM industry. The DoD depends on a vast network of commercial ground and space-based systems to meet its telecommunications needs. In particular, commercial SATCOM is a large part of the space communication system that supports the warfighter. Current estimates are that commercial SATCOM provided about 60% of the wideband SATCOM during Operation ENDURING FREEDOM and up to 80% of the SATCOM during Operation IRAQI FREEDOM.

The strategic relevance of space as a force multiplier underscores the necessity for government to ensure we have a strong industrial base that will satisfy our requirements now and in the future. The Space Industrial Base Council (SIBC), co-chaired by Dr. Kerr and myself, is a forum to address space industry issues and bring together stakeholders from across government to provide coordinated attention and action on space industrial base issues. We have also taken steps to include industry and academia to help inform and implement our initiatives.

BACK TO BASICS IN SPACE ACQUISITION

My second area of emphasis is to get "back to basics" in space acquisitions to maximize the probability for success in our space acquisition programs. Acquisition links technology with operations—turning ideas into real, tangible items and delivering those items to the field. It is a continuous process with four distinct but interrelated stages. The first stage is Science and Technology (S&T), where we conduct basic research and explore the possibilities of new technologies. In the second, Technology Development, we evaluate the utility of discoveries made in the S&T stage. The third stage is Systems Development. Here, we take the most promising technologies and mature them to higher readiness levels so they can be integrated into operational platforms in the fourth stage, System Production.

In this acquisition construct, technology is matured through the four stages to move from the lab bench to the test range to operations. We are emphasizing early technology development to ensure mature technology is available for our production systems.

Basic research in science and technology generates knowledge and helps develop our scientists and engineers in our laboratories, universities, and research centers. This kind of cutting-edge work is inherently high risk--discoveries take hard work and insight but are not predictable--but we want to take risk in the earlier stages. For instance, the Air Force Research Laboratory is exploring everything from material properties of beryllium-aluminum alloys, ceramic-matrix composites, and "aerogel"-based thermal insulation, to the operating characteristics of components and systems such as spinning disk lasers, and on-orbit vibration isolation systems. The DoD investment in space-related S&T has doubled over the last four years.

Once we find a promising technology, we investigate its utility in the Technology Development stage. For example, back in September, the STP-R1 experimental satellite -- the "Streak"--launched from Vandenberg Air Force Base on a Minotaur rocket. It has a payload that will study the low Earth orbit environment, but also has an objective to demonstrate an approach of rapid response, short duration missions. It is one of many projects sponsored by the Defense Advanced Research Projects Agency and run by the Air Force Space Test Program office at Kirtland.

Thus, in the two supporting stages of Science and Technology and Technology Development, the approach is to take more risk and push the frontier harder. We will allow those that are creating new ideas and exploring new technologies greater opportunity to push their ideas forward.

After we prove a concept or demonstrate the technology, we mature it until we are confident it will work reliably in space. We build that confidence and performance during the Systems Development stage, where we get new technologies ready to incorporate into operational systems.

The XSS-11, built at Kirtland Air Force Base and launched from Vandenberg Air Force Base last April, is an excellent example of a space Systems Development effort. The XSS-11 did more than prove a concept and check out technology and techniques for future space missions; it also helped improve the quality, experience and knowledge of our workforce. The program managers and engineers operated on a tight schedule and budget, and even after several technical problems and three different launch platforms they had the vehicle ready to launch within 3 months of the original 36-month development timeline and within a few million dollars of the original budget estimate.

Finally, once we have mature technology, we move into the fourth stage, System Production. As an example, we launched the first modified Global Positioning System (GPS) IIR (GPS IIR-M) satellite in September 2005. It will provide the same GPS signals as earlier GPS IIRs, plus two new military signals and another civilian signal. Since the early GPS I series, the program has evolved through a block approach where each increment has provided additional capabilities. GPS satellites are operational assets used by troops in the field. We must minimize the risk involved as we produce these systems and in the System Production stage, we want to integrate mature technologies while employing a disciplined systems engineering process. We must also design in testability and modularity so that we have a path to spiral newly matured technologies into operational systems. We are reducing the risk in that final stage of System Production by starting with more matured technologies, more stable requirements, and more discipline in the systems design.

This idea of managing the risk, or apportioning risk in a more controlled manner is important. You can view it as a redistribution of risk where the higher risk is in those beginning stages while we lower the risk in System Production, incorporating only proven technologies and focusing on taking smaller, more manageable steps. By doing so, we allow a constant, on-going rhythm of design, build, launch, and operate. I believe that developing this rhythm of activity will reduce the acquisition cycle time, insert stability into our production lines and workforce, and enable us to field better systems over time, all while increasing confidence in our production schedule and cost. Ultimately, the warfighter should receive a rhythm of needed, timely, affordable capability.

The restructured TSAT program reflects this new approach to meeting warfighter requirements through major discrete increments or blocks. The Quadrennial Defense Review endorsed this TSAT approach as the way to begin accelerating some needed network capability for the warfighter. Consistent with Congressional inputs, we have focused on technology maturity to define the first block for TSAT. The new program will reduce the risk for the first two satellites by providing basic laser communications capabilities and processor/routers in a Block 1 configuration. Higher risk technologies such as a more capable laser communication capability and more capable Internet Protocol Packet-based processing can be incorporated into later blocks of satellites. Block 1 directly corresponds to those technologies that the TSAT Program Office and Government Accounting Office agreed are mature consistent with this phase of the program. We also have increased the budgetary confidence levels of TSAT from 50% to 80%.

In addition, we recently announced an award of the TSAT Mission Operations System (TMOS) contract--the ground segment for TSAT. Going forward with TMOS allows for better development and horizontal integration with other Global Information Grid (GIG) systems. The networking capabilities provided by TMOS are the cornerstone to the future MILSATCOM architecture (AEHF and TSAT) and its interface with the GIG. Since the space segment interface requirements will be consistent with the TMOS design, our approach simplifies design trades for the space segment contractors. The TMOS contract source selection criteria also reflected a decision process which weighted proposal risk and contractor past performance over system mission capability and cost.

This overall approach reduces technology and integration risk and increases our confidence in timely delivery of capabilities to the warfighter--an approach consistent with the 2003 Young Panel recommendations. We are exploring this same approach for Space Radar and GPS III.

We also need to get back to basics in our acquisition practices. A back-to-basics approach hinges on: first, managing risk better; strengthening collaborations between the players involved in the acquisition process; implementing more rigorous systems engineering processes; and, improving the way we recruit and train our acquisitions workforce.

I previously mentioned the various National Security Space stakeholders. As we get back to basics, we need to strengthen collaboration across the space community between technical experts, acquisition personnel, logisticians, and operators to ensure we are developing the systems we really need. There must be an early, detailed dialogue between all the players on warfighters needs balanced against a realistic assessment of what capability can be provided. We are working with the Joint Staff and Combatant Commanders to implement this approach. We should be able to provide significant new capability quicker and be more cost effective while continuing to work towards the full stated objectives in later generations. For example, deliver a first increment/block of system capability that meets 70-80% of the original stated objectives in a more timely fashion while working toward greater capability in future blocks. Key to this effort is to implement and maintain strong discipline in developing and stabilizing system requirements--another facet of sound system engineering.

A critical part of implementing the back to basics philosophy is a heavy emphasis on applying proven systems engineering practices and raising the expertise of our systems engineers. The Air Force's Space and Missile Systems Center (SMC) has instituted a rigorous training program

that includes classroom time, hands-on laboratory experience, Master's level courses, and education with industry. SMC has also captured best practices from across the community while working with the NRO, industry, FFRDCs, and technical societies to develop interface standards. One key aspect of improving the way we manage acquisition risk, and a key facet of our continuous emphasis on system engineering, is to better estimate the cost and schedule through a stronger cost estimation team and applying a more conservative approach in the System Production stage. If we have high confidence in the success of an acquisition program because we matured the technology starting with a strong S&T base, then we also have more confidence in our production cost and schedule estimates.

SPACE PROFESSIONALS / SCIENCE AND TECHNOLOGY WORKFORCE

We have a great team of space professionals in the military, civil service, and industry. We know that many of our experienced people are retiring and we need to focus on the basics of recruiting, training, and mentoring to balance out our space workforce and maintain a strong, dynamic cadre of space professionals—innovators, original thinkers, and people with solid engineering instincts.

To continue to develop, attract, and retain top talent, I urge you to continue supporting programs such as the National Defense Education Program (NDEP)--which started as a pilot program in FY05 called the Science, Mathematics and Research for Transformation (SMART). NDEP targets undergraduates and graduate students studying science, math, and engineering. The President's FY07 budget request (DoD-wide budget line) for NDEP is roughly twice that of the FY06 request.

As important as it is to recruit and train talented performers, it is also important for us to give them the opportunity to work with increasing levels of technology, consistent with the four stages in the space acquisition framework. They should have the opportunity to develop program management and systems engineering skills and gain experience on progressively more complex systems. This will teach them what risks to take, how to make tough decisions, and expand their knowledge base. Science and Technology and Technology Development efforts provide excellent opportunities for this kind of growth.

Our efforts to increase the expertise of the space force are comprehensive. We provide oversight of the space cadre through the Space Professional Oversight Board, co-chaired by the Director of the NRO and myself, which includes representatives from all military services. In addition, AFSPC's National Security Space Institute is expanding and recently completed checkout and startup of their 300 level training course, with the first offerings including students from all services, NASA and the NRO.

Finally, we recently held the first National Security Space Program Manager's Conference to discuss, analyze and exchange best practices and experiences. It was hosted by the Air Force's Space and Missile Center and attended by space acquisition officers from the Air Force, NRO, DARPA, Army, Navy, and the laboratories.

CONCLUSION

Space capabilities are essential at all levels of military planning and operations. To win the Long War, we must leverage our space contributions along with all elements of national power. As the DoD Executive Agent for Space, I am confident that the directions outlined here will help us improve the way we use existing space assets, acquire new capabilities, and

integrate with other stakeholders relying on the National Security Space community today and into the future. Thank you for the opportunity to present our approach and our emphasis on integration, back to basics in acquisition, and our space workforce.

I appreciate the continued support Congress and this Committee have given to help deliver vital space capabilities, and I look forward to working with you.

Statement for the Record by

Dr. Donald M. Kerr

Director, National Reconnaissance Office

For the Hearing on the

FY 2007 National Defense Authorization Budget Request

To the House Armed Serviced Committee

Strategic Forces Subcommittee

16 March 2006

Introduction

Thank you for the opportunity to come before your subcommittee to talk about the National Reconnaissance Office (NRO), its future, the relationship between the NRO and the larger national security space establishment, and the very important role the NRO plays on a daily basis in direct and indirect support to the warfighter.

Unfortunately, my enthusiasm for what we do must be tempered today by the fact that this is an unclassified hearing. While it is a privilege to be able to share with you some insight into the NRO and what we do for our nation, I will not be able to go into detail and I ask that you keep this in mind when we proceed to your questions. I would welcome the opportunity to meet with you separately to discuss the NRO in greater depth and my plans for its future. Better yet, please consider a visit to the NRO to get a first-hand look at what we do.

The Future of the NRO

Last July the Secretary of Defense (SECDEF), with the concurrence of the Director of National Intelligence, appointed me as the 15th Director of the NRO. While the job was new, my familiarity with the NRO and its programs was not. In 2001, I was charged by the SECDEF and then Director of Central Intelligence to lead a panel to assess how innovative remote sensing technologies could support future national security needs. The panel findings and recommendations, published in

October 2001, remain largely valid today, but the urgency is greater than ever. Today's national security depends more than ever on capabilities that can only be delivered from space; the only place we can achieve the degree of global situational awareness needed by the Intelligence Community (IC) and the Department of Defense (DoD). In order to meet these needs, the NRO must develop systems with the ability to cue other systems and users, and at the same time provide focused collection anytime and anywhere. Because today's users are fundamentally different, they are no longer satisfied with data; they are rightly demanding information tailored to their interests and problems, a by-product of our fast-paced world, where timely decisions impact the lives of our warfighters and the security of our nation.

In order to meet these demanding needs the NRO will pursue two strategic goals:

- Be the foundation for global situational awareness and;
- Provide intelligence within timelines responsive to user needs.

Meeting these goals will require the NRO to plan, develop, and manage an integrated architecture focused on creating intelligence value for our users. An important aspect will be the use of the latest technologies on the ground to realize and take advantage of new capabilities for existing overhead systems. Our ground systems will be essential enablers for the cueing, tip-off, and information fusion capabilities required to

build comprehensive understanding of our adversaries' actions and intentions. In fact, because of the leverage we can achieve on the ground, ground-based capabilities will be as critical as overhead collection in meeting the need for actionable intelligence.

The NRO cannot do this without the strong partnership with our key stakeholders and mission partners. Our relationships with the military services, USSTRATCOM, National Security Agency (NSA), National Geospatial-Intelligence Agency (NGA), Homeland Security, and others are critical in helping us meet our worldwide intelligence, surveillance, and reconnaissance responsibilities. Certainly, one of our most important stakeholders is the U.S. Congress, and I ask your support in implementing the changes required to keep pace with today's threats.

The NRO and National Security Space

One topic of particular interest today is the nature of the relationship between the NRO and the DoD--in particular the Air Force space community. The NRO and the Air Force have a cooperative and collaborative partnership which is critical to our mutual success. We leverage each other's expertise and resources to meet each of our unique mission objectives. However, space is our common operating environment, not our mission. Even so, the NRO and the Air Force have intersecting interests in areas such as personnel, mission assurance standards for spacecraft, assured access to space through launch

services, spacecraft development, and providing ways to best support the warfighter. I am excited to say we have a long history of successful collaboration with the Air Force and I expect it to strengthen. Some areas of success include:

- Manning. The NRO is a joint venture between the DoD and the IC. The NRO could not do what it does today without the commitment of all the military services and their remarkably talented and extremely capable personnel. The Air Force provides nearly half of the NRO's workforce. The Navy, Army, and Marines also provide technical and support staff. We are actively engaged with our Service partners, especially the Air Force, in ensuring that we have a robust, dedicated, career space cadre for the national security space community.

- Mission Assurance. Satellites are expensive and complex, operating in a very extreme environment. Because of this, they require unique engineering, design, and testing considerations to meet the mission requirement over the life of the spacecraft. Improving on mission assurance is a concern of the NRO and an area in which the NRO is strengthening its collaboration with the Air Force. The NRO is in close coordination with the Air Force on common spacecraft issues, such as parts, materials, technologies, standards, and acquisition policies.

- Launch. The NRO collaborates with the Air Force on launch vehicle acquisitions, as well as launch base operations and infrastructure to support NRO launches. Recognizing the lack of a robust commercial market that meets our requirements,

the NRO and Air Force have worked shoulder-to-shoulder over the past two years to develop a strategy for future launch vehicle acquisitions. Additionally, the NRO relies on Air Force aircraft and crews to transport our spacecraft from the factory to the launch base.

- Spacecraft/Sensor Integration. The NRO has a longstanding and successful history with the Air Force as well as other military services of hosting payloads that help meet system and service requirements. Maintaining this flexibility is an effective way for us to reduce the cost of placing capabilities in space, particularly for demonstration payloads.

These are but a few examples of our close partnerships and their importance. However, in the end, what is truly important is how we ultimately serve our customers. Of particular importance today is what we do for the warfighter.

Support to Military Operations

For over the past decade, one of the real success stories at the NRO has been the aggressive path we have taken to find new and innovative ways to support our men and women in uniform. This is an outgrowth of our experiences and the lessons we learned in the first Gulf War. The capabilities to acquire and deliver timely information to the battlefield were growing, but still immature. At the same time, the military was coming to the realization that space capabilities could be a powerful force multiplier if fully used, and the support could be both

reliable and tailored to their needs. This is where we continue to place a lot of effort.

In response to the attacks of 11 September 2001, and in support of Operation ENDURING FREEDOM (OEF) and Operation IRAQI FREEDOM (OIF), the NRO established internal crisis support working groups to serve as focal points for NRO-wide support to coalition forces engaged in operations in Afghanistan and Iraq. The goal was to ensure all pertinent NRO capabilities, both proven and in development, contributed to achieving warfighter success. Areas of specific support included NRO personnel deployments to ensure "help on-hand", training of deployed and deploying warfighter forces, and the provision of new or updated NRO-developed equipment, systems, and data applications to satisfy specific warfighter needs. These ad-hoc groups can be immediately established to support any national or world crises that require national technical means support.

NRO Personnel Deployments. The NRO deployed government and contractor personnel to the combat theaters in support of OEF and OIF and others were deployed to major combatant commands. These forward-deployed NRO personnel augmented the warfighter's operations and provided the technical expertise needed in-theater to fully exploit national systems. Additional NRO personnel were also deployed to the combat theaters for short periods to execute specific support activities.

Training the Warfighters. In fiscal year (FY) 2005, the NRO provided multi-discipline education and training to more

than 4,000 personnel attending Service Schoolhouses and Professional Military Education Institutions. Additionally, hands-on training during exercises, experiments, and demonstrations involving live and simulated national systems support, occurred during 40 major military exercises worldwide. As another part of this effort, the NRO deployed mobile education training teams (METTs) designed to ensure the maximum impact of NRO capabilities. During FY 2005, over 30 METTs visited four theaters of operations, touching over 80 elements, units, and commands, including forward deployed warfighters in the USCENTCOM theater. Members of this team, which routinely included NGA and NSA personnel, taught troops the latest techniques to fully exploit NRO systems, derived data, and capabilities.

NRO-developed Equipment, Systems, and Data Applications. Following 11 September 2001, the NRO assessed its many systems and capabilities for their potential applicability to the Global War on Terror (GWOT). The NRO refocused and developed new capabilities. A few examples follow:

- Blue Force Tracking (BFT) devices. These devices provide operational commanders periodic reports on the locations of their forces depicted automatically as icons on a map display. These BFT displays enhance commanders' situational awareness, providing them the opportunity for quicker, more-refined analyses, decision-making, and operational execution.

- Battlespace Visualization Initiative System. This system provides planners and analysts 3-D displays of U.S. multiple intelligence collection operations against a specific area. In its GWOT application, it allows planners and analysts interactive visualizations of collection opportunities that can be used in counterterrorist operations management, analysis, and research.

- The Threat HUMINT Reporting, Evaluation, Analysis, and Display System. This software prototype assists analysts in corroborating data from human intelligence reporting by performing an automated comparison to data from national systems. Information corroborated by several sources leads to more actionable intelligence that can be used more effectively against our adversaries.

The NRO's Deputy Director for Military Support leads these efforts and provides the national technical system focus to effectively support U.S. and coalition counterterrorist military operations worldwide. As you can see, our support spans deploying knowledgeable people, providing the training, and delivering the much-needed systems to enhance warfighters exploitation of national systems capabilities.

Conclusion

This is a time of challenge and change for the NRO, and I believe it is important you have the full context for what we are doing to ensure the NRO is keeping up with the evolving threat, and meeting the needs of a more demanding and

knowledgeable community. I repeat my invitation for you to visit the NRO for an in-depth look at what we do and to meet the outstanding people who make it possible.

Thank you and I look forward to your questions.

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HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON STRATEGIC FORCES

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON STRATEGIC FORCES
UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: SPACE POSTURE

STATEMENT OF: LIEUTENANT GENERAL FRANK G. KLOTZ
COMMANDER, AIR FORCE SPACE COMMAND

MARCH 16, 2006

NOT FOR PUBLICATION UNTIL RELEASED BY
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON STRATEGIC FORCES

INTRODUCTION

Mr. Chairman and distinguished members of the subcommittee, it's a great privilege and an honor to appear before you today to represent the nearly 40,000 men and women of Air Force Space Command (AFSPC), stationed around the world, standing watch 24 hours a day, 7 days a week, 365 days a year. At this moment, this fully-integrated team of Active Duty, Reserve, Guard, government civilians and contractors are delivering space effects to joint warfighters, as well as civil and commercial customers. They accomplish this by planning, operating, maintaining, securing and supporting our Nation's Minuteman III Intercontinental Ballistic Missile force; flying our communications, early warning, weather, and precision, navigation and timing satellites; monitoring the ground-based radars and other sensors that provide early warning, and locate and track thousands of objects in space; assembling and launching boosters and maintaining the ranges for the launch of satellites; and, developing and acquiring the next generation of space and missile systems to help ensure America's strategic, commercial, and scientific advantages in space well into the future.

Along with their colleagues in the National Reconnaissance Office (NRO) and across the entire National Security Space (NSS) enterprise, the men and women of Air Force Space Command represent the best and brightest of our Nation's sons and daughters, and we have every reason to be proud of them and of their service to our country.

Today, we will recap some of the significant accomplishments and milestones from the past year, as well as address Air Force Space Command's vision and strategic

priorities for the future. In addition, we will offer some perspective on the Quadrennial Defense Review as it pertains to space and missiles. The bottom line is that success in building space capabilities directly translates into success on the battlefield, reduces collateral damage, saves lives, and protects our Nation's advantages and critical infrastructure in space.

THE YEAR IN REVIEW

We have witnessed several key milestones and made significant progress since this committee last met to discuss our Nation's space posture. Over the course of the past year, we have enhanced the Nation's security by ensuring space superiority and providing joint space combat effects for our forces, maintained a safe and secure strategic deterrent, and provided assured access to space for a myriad of users.

Yet 2005 was also a year tinged with some sadness for the space enterprise. On June 20th, 2005, we lost a great leader when General "Bennie" Schriever, the "father of space and missiles," passed away. Throughout the Cold War, his was one of the most articulate and effective voices advocating for the space and missile capabilities we now take for granted. Like so many other pioneers, he was often chastised for his outspokenness. Time, of course, has proven General Schriever to be right and his contributions vital to our national security. While General Schriever and other visionary leaders are no longer with us, their spirit of service and determination lives on. We succeed because our space warriors, like my predecessor General Lance W. Lord, are the best at what they do. They secure our homeland, make joint warfighters more

combat effective, and provide national decision-makers with the information they need to ensure our security and prosperity.

To better understand what this progress has meant, I would like to briefly highlight some of our recent accomplishments.

Joint Space Combat Effects

The establishment of the Joint Space Operations Center (JSpOC) at Vandenberg AFB, California has ushered in a new era in providing space combat effects to joint warfighters around the world. For the first time, space assets are commanded and controlled by a single entity. In essence, the JSpOC serves as a one-stop shop for all of our DoD space capabilities by integrating joint-space assets. It improves U.S. and Allied warfighting capabilities by providing a shared situation awareness to commanders of air, land and sea forces across all levels of conflict--strategic, operational, and tactical.

Additionally, we have matured our Director of Space Forces concept and made it a vital part of the forward-deployed CENTCOM leadership team. Our presence and direct support of theater forces have made a difference. The result is Combatant Commanders now have access to more responsive, tailored space capabilities than ever before. However, this is just a first step. To further advance our ability to fully support theater commanders, we are pursuing a Space Command and Control architecture to build a fully interdependent, net-centric, robust space presence that meets future warfighter demands.

We currently have the most capable Global Positioning System (GPS) constellation in history. Position, navigation and timing provided by GPS continues to transform the battlefield and turbo-charge global commerce. We continue to see this first-hand in our ability to strike targets with unprecedented precision and in our ability to rescue downed aircrew. Our Air Force Chief of Staff, General Moseley, emphasized the consequences of not having GPS-aided combat search and rescue when he stated, "If you float down into that world...they will kill you." GPS provides the positioning information that allows rescues to occur in minutes versus hours or days. In short, space takes the "search" out of "search and rescue" and saves lives, each and every day. In 2005, we reached an historic milestone as the 18,000th person, world-wide, was rescued with the assistance of satellite-aided search and rescue. The successful launch and initialization of the GPS IIR-M satellite was yet another historic milestone, which will ultimately supply new military and civil capabilities to people around the world. It will provide a significant improvement in information assurance and more protected signal than the current constellation. These new capabilities further solidify our position as the preeminent provider of position, navigation and timing data with real, highly-capable satellites already on orbit.

Our meteorological, space warning and MILSATCOM capabilities are surpassing expectations every day. Whether providing real-time forecast updates via the Defense Meteorological Satellite Program (DMSP), ensuring constant missile warning "top cover" with the Defense Support Program (DSP), or delivering the vital command and control capabilities using our Milstar and Defense Satellite Communications System (DSCS) we are making our deployed forces more combat effective. We have engineered methods

to leverage each of these systems in ways never imagined during their inception and original development, while aggressively managing our on-orbit assets so they exceed their expected life spans by considerable margins.

In addition to supporting the joint warfighter, we proved the importance of space to the security of our homeland. Following Hurricanes Katrina and Rita, space capabilities were the lifeline to many in the devastated Gulf Coast region. Weather, navigation, communications and satellite imagery were just a few of the capabilities we provided. Along with my predecessor, General Lord, I had the opportunity to visit the region and was taken aback by the devastation. Simply put, Hurricane Katrina was as powerful as any man-made weapon of mass destruction. However, in the midst of the destruction we witnessed the qualities that make our Air Force so great. We deployed nearly 200 space professionals and eight helicopters to the region to assist local communities with medical evacuations and the safeguarding of resources.

These helicopters, by the way, are assigned to our missile wings to help protect and defend our nuclear resources. While they routinely perform search and rescue missions in the surrounding communities, the hurricane relief operations last fall represented the first time in history we have assembled them as an expeditionary squadron, and employed them as a "package" halfway across the country. As we debate the importance of replacing Air Force Space Command's aging UH-1N "Huey" fleet, we must bear in mind that these helicopters will have a value to the Nation beyond their critical nuclear security mission.

We also deployed the first-ever Director of Space Forces in the Continental United States to support Joint Task Forces Katrina and Rita. The Global Broadcast

System (GBS) Joint Program Office (JPO) moved a Theater Injection Point (TIP) and 10 Receive Suites (RS) to Mississippi and New Orleans to support relief operations. GBS operations disseminated video of areas affected and were used to identify rescue locations, assess infrastructure damage and restore essential communication capabilities. The lessons we learned have been instrumental in shaping the way we operate. Specifically, we are becoming more fully integrated into homeland security exercises and plans.

While many of our space superiority achievements fall necessarily in the classified realm, we have achieved several unclassified milestones. In partnership with the Air Force Research Laboratory, the ongoing XSS-11 testing and demonstration is providing valuable insight into the emerging areas of on-orbit rendezvous and proximity operations. Our space operators have now flown satellites in tight formation at more than 17,000 miles per hour in low earth orbit. Additionally, we gained Air Force Requirements for Operational Capabilities Council approval for the Counter Communication System Block 20 Capability Development Document, which will serve as a critical step in securing our Nation's space assets. The 527th Space Aggressor Squadron from Schriever AFB Colorado was instrumental in training warfighters to recognize and operate in GPS and SATCOM-denied environments, as well as conducting vulnerability assessments using commercially available imagery and information. These efforts are serving as a guide for many of the key technology challenges we face in this important mission area.

Strategic Deterrence

Today, the importance of our Strategic Deterrence capability has never been clearer. As our Chief, General Moseley says, "Our ICBMs are the backstop for the Nation." He is right on target when you consider our Nation has never been attacked with a weapon of mass destruction despite various threats over the decades. In my mind, it's because our ICBM warriors, along with their bomber and submarine colleagues still stand their silent vigil.

The size and composition of our ICBM force continues to evolve in response to the changing strategic environment. Following the signing and ratification of the Moscow Treaty, Air Force Space Command began the process of deactivating the Nation's 50 Peacekeeper missiles in October 2002. In September of last year, we removed the last Peacekeeper missile from its launch facility, ending a proud chapter in the history of our ICBM fleet. For two decades, the men and women of Peacekeeper answered the call and delivered mission success. What is equally impressive, in my mind, is that we accomplished this three-year deactivation without a single security breach or safety mishap--a tribute to the skill and dedication of the young Airmen who performed this complex and arduous undertaking.

Even though we've deactivated the Peacekeeper missile, the ICBM continues to be an integral part of our Nation's strategic deterrent. For this reason, Air Force Space Command is committed to ensuring the Minuteman III ICBM remains an effective and viable weapon system through the year 2020. We recently completed installation of the Minuteman Minimum Essential Emergency Communications Network throughout 20th Air Force. This upgrade greatly enhances the communications links to our strategic

forces. Additionally, thanks to the strong support of this subcommittee and Congress, we have continued to make steady progress on the Propulsion Replacement Program and Guidance Replacement Program, and to begin refurbishment of the Propulsion System Rocket Engine. We also stayed on track to field the Rapid Execution and Combat Targeting Service Life Extension Program, beginning in 2006, to sustain our Launch Control Centers. We also conducted three successful test launches of the Safety Enhanced Re-entry Vehicle (SERV), which will allow us to deploy the warhead used on the deactivated Peacekeeper ICBM on a portion of the Minuteman III fleet. Finally, we completed our work on the Analysis of Alternatives for Land Based Strategic Deterrent, recommending an evolutionary approach to the replacement of the Minuteman III capability.

The opening of AFSPC's first-ever Nuclear and Space Security Tactics Training Center at Camp Guernsey, Wyoming, provides our security force warriors, maintainers and operators a much needed place to exercise their combat skills. For the first time, our front line of defense is receiving the "graduate-level" weapons and security tactics training to defend our nuclear and space assets, as well as properly preparing for deployment with our Air Expeditionary Forces. This Center also witnessed an important step forward in forging closer US-Russian relations. Following an agreement between Presidents Bush and Putin in February 2005 to enhance cooperation between our two countries in nuclear security, a 12-person Russian delegation, led by General-Lieutenant Vladimir Verkhovtsev, visited Camp Guernsey to participate in Air Force Space Command's annual Road Warrior nuclear convoy security exercise. Together, we are learning from each other's best practices and improving security for both

Nations. Finally, it's important to note, this facility would not have been possible without the close cooperation of the Wyoming National Guard. Their assistance significantly reduced the cost to the Air Force, provided access to state-of-the-art firing ranges, and permitted training to start in the first year of inception.

Assured Access to Space

Our launch teams, composed of managers and engineers from the Space and Missile Systems Center, and launch and range operations maintenance experts on both coasts, have truly delivered on the challenge to work towards cost-effective assured access to space. In the launch business, there is nothing more costly than failure as evidenced by the multiple launch mishaps we experienced in the decade of the 90s. However, in 2005 our launch professionals showed the world we have turned the corner.

In the spring, we launched our final Titan IV from the east coast. On October 19th, we closed the book on Titan from Vandenberg AFB, California. Including all of our launch systems, that was our 44th consecutive successful launch, which broke the previous launch record set in 1971. Our new Evolved Expendable Launch Vehicle is also off to a superb start, and now has 11 successful missions out of 11 launches. Based on historical launch failure rates of 1 in 10, the cumulative launch success accomplishment represents an approximate savings of $1-3 billion for the American taxpayer.

As we look to the future, we are examining the ability to use smaller, lower cost satellites that could be employed rapidly in response to the needs of our Combatant

Commanders requirements. In concert with these efforts, we should also develop smaller payloads that leverage advanced technologies. Initiatives like the Tactical Satellite or "TacSat," when combined with traditional satellite constellations may help us move beyond our preconceptions and break through existing paradigms.

2006 PRIORITIES

This year, we remain committed to our vision to become **"A Full-Spectrum Space Combat Command Preeminent in the Application of Space Power for National Security and Joint Warfare."** We have also adjusted our strategic priorities slightly to emphasize a few key areas: the importance of securing the space domain, strategic deterrence, space acquisition, as well as the development and quality of life for our people. However, our focus remains laser sharp. We will continue to deliver on our promise to be the world's greatest space and missile force by championing four strategic priorities:

1. Secure the Space Domain and Provide Space Combat Effects to Joint Warfighters
2. Maintain a Safe and Secure Strategic Deterrent and Pursue New Triad Capability for the U.S. and its Allies
3. Make Space Acquisition the DoD Model for Acquisition Excellence
4. Provide World-Class Professional Development and Quality of Life Opportunities for our People

These priorities not only are the right direction for Air Force Space Command, but they are also in line with the priorities of General James E. Cartwright, the Commander of United States Strategic Command, as well as Air Force priorities laid out by our Secretary of the Air Force, The Honorable Michael W. Wynne and our Chief of Staff,

General T. Michael Moseley. Now, more than ever, it is critical for us to act in concert and be good stewards of the taxpayer's money.

Priority #1: Secure the Space Domain and Provide Space Combat Effects to Joint Warfighters

Supporting the joint warfighter is at the heart of everything we do in Air Force Space Command. The asymmetric advantage space provides is a critical lifeline to those who are in harm's way each and every day. For that reason, it is more important than ever to maintain our technological advantage.

While it is true our on-orbit space systems have outperformed our expectations, it is equally true they will not last forever. We are at a crossroads in providing space combat effects to the joint warfighter. As the average age of our constellations reaches and exceeds their design life we must maintain our commitment to next generation systems.

The Defense Meteorological Satellite Program (DMSP), which was so instrumental in warning the Gulf Coast during this past hurricane season and during Operations IRAQI FREEDOM and ENDURING FREEDOM, is exceeding its design life. The satellites in the DMSP constellation were engineered to stay on orbit for 48 months. The current average satellite in the operational constellation has been on orbit for more than 56 months. While on one hand this represents an enormous technological and engineering achievement, it is also worrisome to those who depend on its capabilities. DMSP is capable of meeting current needs, but there is an urgent requirement for more robust data. The customers of DMSP are counting on our ability to deliver the next

generation of systems, like the National Polar-orbiting Operational Environmental Satellite System (NPOESS).

NPOESS will provide higher resolution and increased data availability to the warfighter over the current DMSP constellation. For the warfighter, this means we are better able to provide advance warning of adverse weather conditions and more decisively take the fight to the enemy. Here at home, NPOESS and similar capabilities are the first line of defense against natural disasters like Hurricane Katrina. As forecasting accuracy dramatically improves, our federal, state and local responders will gain valuable time to deploy limited resources. NPOESS will be a life-saver both here and abroad.

Our Defense Support Program (DSP) constellation is providing unparalleled strategic and tactical missile warning. It is our first line of defense against a surprise attack both on the battlefield abroad and here in our homeland. When DSP was designed, its capabilities were focused on strategic warning. Today, it does that and so much more by performing functions well beyond its design specifications. Our DSP constellation is exceeding its design life and getting older. Now more than ever, it is imperative we deliver on the Space-Based Infrared Satellite System (SBIRS).

The potential impact of SBIRS is simple to explain. At the start of Operation IRAQI FREEDOM, our ground troops charged across the Kuwaiti border towards Baghdad. During that charge, the Iraqi Army attempts to repel our ground forces many times came in the form of rocket attacks. Existing capabilities allowed us to determine the general area where an attack originated, but did not provide data with enough accuracy for our forces to immediately neutralize the threats. With SBIRS, our forces

will know precisely where the enemy is after the first salvo. This level of precision will allow us to silence a hostile force before they can take a second, third or fourth shot.

Thousands of joint warfighters are currently relying on the Defense Satellite Communications System (DSCS). This constellation has also exceeded all expectations and like other satellite constellations, it is getting older by the day. The average age of a satellite in this constellation is over eight years--it was designed to operate for 10 years.

The follow-on Wideband Gapfiller System (WGS) will give our warfighters needed increases in bandwidth and the ability to move towards a highly mobile, fully integrated force. WGS is scheduled to begin replacing the DSCS constellation in 2007. Amazingly, every WGS satellite launched will have more throughput capability than the entire DSCS constellation currently on orbit. Every WGS launch will literally mean an entire new constellation in terms of capability provided to the warfighter.

Even the relatively young Milstar constellation will soon reach its design life. The average age of our current Milstar satellites is nearly seven years and it too was designed with a 10-year life expectancy. Our special operations forces have come to rely heavily on the unique communications capabilities currently provided by Milstar, which has been key to shrinking the "kill chain" from days and hours to literally minutes. Development of the Advanced Extremely High Frequency (AEHF) satellite will guarantee we continue to provide protected, survivable, anti-scintillation, anti-jam, low probability of intercept communications.

The Transformational Satellite (TSAT) constellation is the next step after WGS and AEHF. It will enable "communications on the move" and will transform the Services' net-centric architectures including the Army's Future Combat System, the Navy's ForceNet, the Marine Corps' X-Net concept and the Air Force's Global Information Grid initiative. Without TSAT these Service programs and the capabilities become less effective--TSAT is in integral part of the concept of operations.

Without a doubt, information is one of the vital keys to our mission success. Our future satellite communication systems will continue to revolutionize how we fight. An 8"X10" image takes 2 minutes to transmit over Milstar, but will take just 24 seconds with AEHF. With TSAT, the same image will be transmitted in less than 1 second. A UAV image, which used to take up to 12 minutes to send via Milstar, will be sent in less than 1 second with TSAT. AEHF will be capable of transmitting the entire Air Tasking Order in approximately 1 second. This is the same Air Tasking Order that had to be flown via helicopter to command centers and aircraft carriers during Operation DESERT STORM.

When you are operating on the ground, or on the open seas, or at 35,000 feet, and repairs are needed, you can return to base, dock in port, or land at an airfield. The Hubble Space Telescope, which operates at a relatively low 320-333 miles can be repaired using manned space capabilities. However, when you operate at more than 22,000 miles, like our geosynchronous satellites do, there are no options. When the fuel runs out, there is no hope of gliding to a safe landing. When a primary component and its backup fail, you go with only a subset of the capability or sometimes without the entire spacecraft. The top-notch leaders of operations and sustainment programs are

continually being asked to do more with less to keep the current aging constellations operational until follow-on systems can replace them. Funding cuts, along with fact-of-life satellite development slips, have delayed legacy satellite replacement systems. This has forced Herculean efforts on ground-based constellation operations and sustainment programs to keep these legacy systems operational well past their design life.

Current satellite systems are flying well beyond their engineered life cycles. This has enabled the Command some flexibility in programming and deployment to address budget cuts and development slips. Extending satellite life has required efforts such as power-management (turning power off to secondary payloads/capabilities), reduced station-keeping maneuvers (greatly increasing risk of losing primary capability if a satellite drifts), and reducing fuel budgets for end-of-life disposal.

Ground sustainment is key to successfully extending any satellite system's constellation life. Robust factory and on-site contractor support has ensured all aspects of operations are optimized, provided real-time anomaly analysis and recovery, ensured data and trending analysis for all phases of satellite life, and provided continuity and reach-back capabilities for each program. However, we can only do so much with the resources available.

As we are operating and maintaining our current systems, we are also bringing on new space systems that will provide our warfighters with the critical edge only these technically superior systems can. It is vital for us to overcome challenges in developing next generation systems and field transformational capabilities. The TSAT, SBIRS, WGS, NPOESS and AEHF constellations must remain our top priorities.

An additional capability that will pay dividends is the Space Radar system. Our strong partnership with the National Reconnaissance Office will ensure Space Radar provides persistent, day and night, world-wide, all-weather, ISR capabilities for military, intelligence, and civil applications. It will employ multi-mode radar to deliver a range of products, including high resolution images and terrain information, moving target indications, and ocean surveillance. The combined on-orbit and interdependent ground architecture will enable a transformational capability to hold our adversaries at risk.

Air Force Space Command remains committed to securing the space domain and protecting our asymmetric advantage. We have witnessed attempts to negate this advantage and understand the need to protect our space systems. Given the opportunity, our adversaries will attempt to exploit any and all weaknesses. Our primary focus in the endeavor is Space Situation Awareness (SSA). Our ability to thwart attacks against our space systems is dependent on our ability to know who is operating in the domain, what capabilities they possess and their intentions. Our current SSA capabilities are not adequate to counter future threats. We must take the necessary programmatic steps to ensure we know what each new spacecraft is capable of before it is in position to impact our support to the joint warfighter. Of course, SSA is just the first step in securing the space domain. We also continue to work towards systems that can protect our space assets and ensure the capabilities they provide are available for the joint warfighter.

One initiative that will enable us to better protect our systems and operate more closely with joint warfighters, is the integration of several or our aggressor units into the Air Force Warfare Center at Nellis AFB, Nevada. Organizational changes at the Space

Innovation and Development Center (formerly the Space Warfare Center) and the Air Force Warfare Center will provide for enhanced training at exercises such as RED FLAG, BLUE FLAG and DESERT RESCUE. United States Central Command has recognized the value of these capabilities and by-name requested space aggressors to identify vulnerabilities to Intelligence Surveillance Reconnaissance and SATCOM reach-back capabilities.

Priority #2: Maintain a Safe and Secure Strategic Deterrent and Pursue New Triad Capability for the U.S. and its Allies

Every day our Intercontinental Ballistic Missiles deliver the "non-kinetic effect" of Strategic Deterrence. Today and in the future, we are committed to safely and securely operating this valuable resource.

We continue to use an evolutionary, block development approach towards a new Land Based Strategic Deterrent (Minuteman IV). This effort reduces risk while at the same time ensures we can effectively sustain our strategic deterrent force.

Space Warriors are analyzing all options for developing and fielding a capability for Prompt Global Strike (PGS). As the QDR states, we are shifting from responding after a crisis starts (reactive) to preventative actions so problems do not become crises (proactive). We are also shifting from a "one size fits all" deterrence strategy to tailored deterrence for rogue powers, terrorist networks and near-term competitors. We simply do not have the ability to be in all places at all times. PGS would give us the ability to respond conventionally to the full range of contingencies--24 hours a day, 7 days a week, 365 days a year. That may mean we can strike a terrorist cell before they disperse to carry out an attack. In highly defended areas of the world it also has the

potential of keeping our troops out of harm's way while at the same time allowing us to hold targets at risk.

The ICBM mission area further offers an opportunity for substantial cost savings with minimal investment. One out of every five uniformed members of Air Force Space Command is currently assigned to Security Forces. This requirement is driven largely by a traditional security architecture in our missile fields, which can and must be modernized. While it does the job, it may not be as efficient as it could be. Technological upgrades to our missile fields could potentially reduce our footprint on the ground while at the same time increase the security of our ICBM fleet. The bottom line is to translate these potential manpower reductions into cost savings and greater security.

An often overlooked ingredient to our strategic deterrence is our early warning radar capability. These systems form the backbone of a robust National Ballistic Missile Defense. Our ability to intercept a hostile attack is dependent on our ability to first detect and precisely track an inbound warhead. Modernization efforts are a critical first line of defense, providing national-level decision-makers the time they need to formulate a response.

Priority #3: Make Space Acquisition the DoD Model for Acquisition Excellence

There is no doubt, we have experienced many challenges in acquiring next generation space systems. In 2005, we laid the foundation for a solid future for space

acquisition as we set out a marker for our acquisition efforts. We intend to be the DoD model for acquisition excellence. We are proud to report Lt Gen Mike Hamel and the Space and Missile Systems Center team have already charted our path and moved out towards that goal. Our recipe is simple: (1) develop and inspire world-class **people**, (2) refine our **processes** for success, and (3) forge **partnerships** within the Command and across the DoD, Services, agencies, and industry.

As General Lord noted during his testimony on space acquisition to the House Armed Services Committee in July 2005, our major programs developed in the 1990s had multiple congenital defects. Addressing these acquisition challenges is critically important to the joint warfighter, and we in Air Force Space Command are committed to doing our part to ensure robust space capabilities are brought to the fight.

At the Space and Missile Systems Center, we are concentrating on realigning the organizational structure, rebuilding the space acquisition workforce and refining our development and program management processes. The steps we are taking will revolutionize our culture, processes and products.

In addition, we are committed to mitigating risk across the entire space portfolio. One of the key ingredients in this effort involves our "walk before you run" strategy. In the past, over-optimistic estimates of the maturity of key technologies and system complexity have led to failure. Our evolutionary, block development approach will enable us to gradually introduce new technology as it matures.

Another ingredient to our success lies in robust research and development (R&D) programs. As such, R&D is essential in our effort to reduce risk. We are also committed to close partnerships with the Defense Advanced Research Projects Agency,

the Air Force Research Laboratory, the NRO, and the other Service R&D organizations so that we maximize the effect of R&D dollars across the National Security Space enterprise.

Space professionals are the building blocks of our acquisition efforts. We have worked hard with the Air Force Personnel Center to stabilize the acquisition team through tour extensions to four years for most space acquisition personnel and have reorganized the Space and Missile Systems Center. These adjustments help ensure stability across the workforce, which is essential to enforcing accountability and ownership.

Winning this battle will also require us to break down existing stovepipes by horizontally integrating across the NSS enterprise. We are emphasizing lean, transparent processes with solid business ethics and a clear recognition integrity must always come first. A healthy relationship with industry is another essential ingredient. Towards this goal, we understand the need for honest dialogue on cost and for establishing realistic expectations of untested technologies.

Currently, we stand at a crossroads in our recovery efforts. We are not yet up to full speed, but we are making progress. As we move further into the second half century of space, it will be vital to incorporate the lessons learned from our many hard fought battles, but not be paralyzed by past mistakes. We are working hard to restore credibility in our acquisition processes. The challenge for space professionals across all Services will be to maintain the initiative and patience to see these efforts through to the end.

Over 45 years ago, the developers of our Nation's first photo reconnaissance satellite, CORONA, demonstrated the kind of persistence necessary to fielding cutting-edge and ultimately strategically decisive space capabilities in the face of technical and budgetary challenges. The combined AF-NRO development team did not back down, even after the first 12 satellites were destroyed during launch or failed after reaching orbit. Success didn't happen until the 13th launch! Imagine where we would be today if they had quit after the 1st failure, or the 5th, or the 12th?

In the coming months and years, we will begin to see small achievements build momentum towards greater acquisition successes and accomplishments. While this is truly amazing, it is in no way as important as our people. Without trained, equipped and motivated people, the most advanced space weapon systems are worthless.

Priority #4: Provide World-Class Professional Development and Quality of Life Opportunities for our People

The last 12 months have seen us make great strides in our Space Professional Development initiative. We graduated the first two classes of Space 300 (Advanced Space Professional Development) students and in doing so rounded out our continuum of space education. The development of our SMC Acquisition School has us postured to develop future acquisition leaders. The Space Education Consortium, led by the University of Colorado at Colorado Springs, is poised to produce tailored programs to further enhance the knowledge of our space professionals. The detailed inventory of our space professionals has enabled us to reshape the assignments process--matching the right person to the right job to deliver mission success. In November, we pinned on the first new space badges, which are a powerful symbol of how we are forging the Air

Force Space Command of the future. We are postured for one goal--delivering space combat effects to the joint warfighter and for the Nation.

One of the keys to our success has been our Total Force approach to accomplishing our space and missile missions. By striving to operate as one team--Active Duty, Reserve, Guard, civilians and contractors--we continue to achieve success with increasingly complex space missions. We take great pride at Air Force Space Command in being regarded as one of the leaders in the DoD due to how we employ people in the development, acquisition and operation of our weapon systems. Our record of performance truly sets us apart. Our ability to leverage the Total Force will become even more vital as the Air Force faces various force shaping and downsizing challenges. Where it is smart to do so, we are putting the talent of our Reserve and Guard forces to work.

The NSS enterprise is also working together in unprecedented ways. Squadron and Group Commanders across AFSPC and the NRO are now selected and assigned by a single, combined board. Senior leaders from both organizations meet to decide what is best for individual development and what is best for the NSS enterprise as a whole.

Furthermore, we are in a better position than ever before to cross-flow space warriors between organizations. We are refining the requirements for each billet and have thoroughly categorized the expertise of each individual. This is allowing us to build the space professionals of the future...today.

Some barriers do still exist in our efforts to transform our workforce and our ability to acquire world-class systems. Everything we do in Air Force Space Command

is joint. However, few positions within the Command carry a joint billet designation. To continue making tremendous strides in bringing space to joint operations, we must encourage our sister Services to provide high quality people to places like joint program offices in SMC, the JSpOC, and the National Security Space Institute. We may want to consider joint duty credit for the appropriate positions as one way to achieve our goal.

Air Force Space Command is also unique in that we rely heavily on contractor expertise. Contractors represent 34 percent of the command's overall manpower and 25 percent of our total acquisition workforce. We leverage contractor expertise to fill our gaps in experience and technical expertise. We are working harder than ever to protect and limit these valuable national assets as we face increasing budget pressure. Perhaps more than any other military command, we rely on contractor support as an integral part of our daily operations since they are imbedded in every Air Force Space Command function, from initial development and acquisition of future systems to our daily operations of space and missile systems. Our industry partners form an integral part of our ability to build and sustain a viable cadre of credentialed space professionals.

Finally, we have fully embraced the President's initiative to inspire young people to pursue careers in math, science and engineering. On February 10th, General Lord conducted the first lesson at Discovery Canyon Middle School in Colorado Springs as part of our new ***"High Frontier Adventures"*** K-12 educational outreach program. Our vision is to use our cadre of 10,000 Credentialed Space Professionals to partner with local schools and help grow our next generation of space leaders. Our future as a Nation, and especially our ability to leverage space effectively, depends on inspiring our

young people. We in Air Force Space Command have the people, skills and desire to make a difference where we can by changing our Nation's math and science education culture...one student at a time.

QUADRENNIAL DEFENSE REVIEW

The QDR, above all else, reflects a process of change as we build our vision and strategy for the future: "We have set about making U.S. forces more agile and more expeditionary. Technological advances, including dramatic improvements in information management and precision weaponry, have allowed our military to generate considerably more combat capability with the same or, in some cases, fewer numbers of weapons platforms and with lower levels of manning." This statement speaks directly to the power of space.

It is imperative for us to realize space is a critical enabler and force integrator across the breadth of joint operations. Space is at the core of our transformational efforts to become an interdependent force. Capabilities resident in the Army's Future Combat System, the Navy's DDX, or the Air Force's Fifth Generation Fighters only reach their maximum effectiveness when they operate as part of a larger network of systems.

Towards this end, the Air Force has begun examining ways to achieve transformational results and become more interdependent. We are moving our Air Force from scheduled air operations to on-call air operations. Next generation satellite communication systems like AEHF, TSAT, and enhanced precision, navigation, and timing with GPS III form the foundation to this transformation.

The success of our air, land and sea forces will depend on our ability to go beyond intelligence handling to intelligence distribution. Furthermore, we will see less reliance on service-centric platforms as we transition to more interdependent capabilities. This will enable US and Allied forces to achieve truly integrated combat effects. The warfighting capabilities we see as essential to our success on future battlefields are wholly dependent on robust space combat effects. If we are going to "find, fix, and finish," space must be integrated into all aspects of the battle plan--today, tomorrow, and well into the foreseeable future.

The first Navstar GPS satellite launched on February 22nd, 1978 offers us a tremendous example. Today, US and Allied warfighters rely on our GPS capabilities in every phase of war and at every echelon, from Combatant Commanders to young privates on patrol. They expect and rely on GPS just as if they were flipping on a light switch. However, it took us more than two decades to reach the level of precision and robust operations we saw in Operations ENDURING FREEDOM and IRAQI FREEDOM. Back in 1978, only a select few envisioned how a space-based capability like GPS would transform the world. To achieve similar transformations we must act now. We are confident the capabilities offered by our next generation space systems will transform modern combat in the same way GPS has today. Our challenge is to remain patient and determined to see these changes through and to make it happen.

The nearly 40,000 men and women of Air Force Space Command have the vision to see the future and the determination to deliver. I am confident that with your help we can and will continue to transform the modern battlefield...not for our sake, but for the sake of America's sons and daughters we call soldiers, sailors, airmen, and Marines.

QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

MARCH 16, 2006

QUESTIONS SUBMITTED BY MR. EVERETT

Mr. EVERETT. Please provide the status of your space cadre efforts, please include activities and progress from each of the services. Also describe your plans for the future.

Dr. SEGA. The Department of Defense is making steady progress developing their space professionals. The services have also taken significant strides since last year's hearings. The Army has completed their Force Management Analysis and has now defined their cadre and have an approved function and managerial plan guiding their efforts. The Air Force has identified all of their military cadre members and implemented a three tier credentialing process. They are now focusing on education and personnel requirements and are performing a comprehensive billet review. The Navy has completed their Space Human Capital Strategy and are using their high performance metrics to ensure that positions within the Navy requiring space expertise are filled at the appropriate level with people that have the necessary experience. The Marine Corps continues to manage their smaller cadre well to meet the needs of the Corps. The Navy and Marine Corps will develop focused, service-specific education and training requirements in the near and mid-term.

The Space Professional Oversight Board provides oversight of our space cadre efforts. In collaboration with the Defense Acquisition University, we have recently deployed a DoD Space Acquisition Continuous Learning Module (CLM) to provide in-depth coverage of National Security Space (NSS) Acquisition Policy 03–01. The Department of Defense will deliver a report in fall 2006 (currently in coordination) space education and training to Congress, as well as complete the departmental instruction on the management of space professionals. The AFSPC sponsored NSSI continues to grow and serve the government space cadre.

Mr. EVERETT. Historically, Satellite Communications (SATCOM) requirements exceed the capability of our government systems. To make up the difference, each year the U.S. military procures over $400 million in bandwidth from commercial satellites. In OPERATION IRAQI FREEDOM over 80% of our military SATCOM was provided by commercial carriers. Does national security require the development of a Commercial Satellite Communications Policy much like the National Remote Sensing Policy? What are we doing to ensure our warfighters are getting the necessary communications capability in a timely and cost effective manner?

Dr. SEGA. Current national space policy (PDD/NSC–49) directs DoD and other US government agencies to "purchase commercially available space goods and services to the fullest extent feasible." There is currently no national space communications policy, and it would best fall to DISA to determine if one was required. Given DoD's growing use of commercial space services, we are taking a structured approach to ensure the government's continued access to those services. This approach takes advantage of commercial services while modernizing a more robust government space backbone to provide services not offered by the commercial sector.

To ensure that warfighters are receiving the capability they need, we are leasing commercial services and pursuing additional military communications satellites such as Wideband Gapfiller Satellites (WGS) (first launch in FY07) and AEHF for protected communication (first launch in FY08). Additionally, DISA is working on more efficient alternatives for acquiring wideband commercial services and will be reporting back to Congress.

Mr. EVERETT. A topic of considerable focus over the last year has been the relationship between black and white space. Please describe your views on this and what should be done in this area in the future. What is the status of the effort by the National Security Office's ability to coordinate efforts between black and white space?

Dr. SEGA. Integration across the Intelligence Community (IC) and DoD space is essential for providing the nation with the space capabilities necessary to support national security. The National Security Space Office (NSSO) is currently supporting efforts to establish National Security Space Architectures that will help integrate efforts and coordinate programs and capabilities to support the DoD, Director of National Intelligence (DNI) and other civil needs. We need to continue our ongoing efforts to maximize the partnership between the Intelligence and Defense

communities particularly in such efforts as Architectures; Concepts of Operations; Intelligence, Surveillance, and Reconnaissance (ISR); Communications; Launch and Ranges, and S&T.

Mr. EVERETT. In dealing with the Space Radar program, Congress has been very explicit on the importance of demonstrating capability and risk reduction on the ground and in the air before rushing to develop a space system. Initial indications from FY06 execution and FY07 planning suggest that did not happen and that the majority of investment will occur in space system development. Please tell us if our expectations were sufficiently clear pursuing the importance of ground and air demonstrations, and if so why you may still believe otherwise.

Dr. SEGA. The Space Radar program has been working very hard to meet congressional expectations to reduce technical risk, develop ground exploitation strategies and seek methods toward horizontal integration. We are pursuing a philosophy of "back to basics" that is based on using proven technologies and on pursuing the level of ground and air demonstrations necessary to verify technology and reduce development and production risk.

Airborne Electronically Scanned Array (ESA) radars have been flown and operated in two test aircraft, and future test flights are planned. In addition, extensive data and lessons learned from other ESA programs are being analyzed. The Space Radar program has also pursued significant investment in ground systems, modeling and simulation, and concept of operations (CONOPS) development. This investment has been able to confirm expected initial Ground Moving Target Indicator (GMTI) algorithm performance. We've also participated in several exercises and have additional efforts planned. The combined and interdependent ground efforts of the AF, NRO, and NGA requested in the FY07 PB bring the program activities back on track and, we believe, in-line with congressional expectations.

Mr. EVERETT. Over the past decade and a half, the NRO has experienced the same if not more significant problems in space systems development as the white world. If Nunn-McCurdy applied to the NRO, numerous programs would have required recertification. How would you characterize the causes and what specific steps are you taking to fix the problems?

Dr. KERR. Many of the significant problems in National Reconnaissance Office (NRO) space system development are due to the effects of the Acquisition Reform era. Consequently, the NRO has gone back to a traditional government oversight role by making mission success, not cost, our top priority. This reflects the way the NRO did business in the years before acquisition reform. Some of the efforts underway to ensure that the NRO is better postured to deliver on its promises are:

Acquisition Policy and Processes Enhancements

Military Standards and Specifications. The NRO is focusing on quality with a return to military specifications and standards on contracts. With imposed specifications, the contractors will converge on a common, standardized practice towards parts selection and add increased rigor to their test programs. The NRO has also expanded the sharing of parts and component issues across the NRO and with other military and civil space agencies.

Acquisition Principles. The NRO Acquisition Management Policy (Directive 7) has been revised to include post-contract award program reviews to increase high-level oversight. A key feature of this update is additional Director, NRO (DNRO) reviews of programs after Preliminary Design Review and Critical Design Review—key acquisition milestones. In previous versions, the last DNRO level review occurred much earlier in the acquisition cycle, prior to release of the request for proposal. These additional senior level reviews will help strengthen the NRO acquisition process and provide additional insight into program status during the design phase.

Independent Reviews. The NRO has also expanded the role of the Independent Technical Assessment Team to address technical feasibility, capability to produce, test, and identify programmatic and technical risks in support of Independent Program Assessment and Independent Cost Estimate.

Senior Management Review of Cost, Schedule, and Performance Data. The NRO has Baseline Agreement.and Acquisition Reports (BAAR) documenting cost, schedule, and performance parameters that are required for NRO programs as designated by the DNRO. Data from the BAAR has been incorporated into the NRO Quarterly Program Reviews, which are chaired by the Deputy Director, NRO and where contract performance and technical risks are reviewed every three months.

Training and Development for our Workforce

Certification Program in System Engineering (SE). In 2005, the NRO established the SE certification program for its personnel. This initiative is in direct response to systems engineering needs identified by the Young Panel and the Mission Assur-

ance Improvement Task Force. The certification is intended to establish standards for systems engineering and to improve organizational effectiveness.

Increased Emphasis in Program Management (PM) Principles. The NRO is developing a formal training and certification program for PM, intended to reinvigorate the workforce with appropriate program management skills. The NRO brings together Program Managers in an annual forum to discuss issues, with the most recent November 2005 PM Conference focusing on "Best Acquisition Practices and Lessons Learned."

Mr. EVERETT. Despite being originally set up for national-level users, today more than 80% of the data that comes from the systems built by the NRO provide direct support to the warfighter. That is unlikely to change anytime soon. In general, how are you ensuring that warfighter requirements are met and receive sufficient advocacy and funding during the development of these systems?

Dr. KERR. The requirements for NRO systems are not controlled by the NRO. The requirements process is led by the Office of the Director of National Intelligence with a major role played by the functional managers for Imagery Intelligence and Signals Intelligence (SIGINT).[1] The Department of Defense (DoD) is represented throughout this requirements process and has the opportunity to influence the outcome based on its needs. The NRO also participates in this process and is in a particularly good position to provide analyses and trades for various proposed architectures and predict their performance against a variety of collection scenarios. However, the Director of National Intelligence, in consultation with the Secretary of Defense, is the final authority for determining the National Reconnaissance Program-funded programs. The DoD has the option of using the Military Intelligence Program to meet additional, DoD-specific, needs or fund enhancements to NRO capabilities.

Last, the NRO Deputy Director for Military Support (DDMS) works to meet emerging and short-term needs of the warfighter. The DDMS has 44 NRO representatives deployed in 34 locations worldwide. These NRO representatives have two primary responsibilities: (1) provide technical expertise on NRO systems and processes in support of the user's mission; and (2) gain direct insight into the users' evolving needs as a means of more smartly incorporating future changes into NRO systems. Through these representatives and other avenues of interaction, the NRO Customer Support Center responded to 2,422 requests for information and assistance in 2005, with 93 percent supporting the military customer.

Mr. EVERETT. A topic of considerable focus over the last year has been the relationship between black and white space. Please describe your view on this and what should be done in this area in the future.

Dr. KERR. It is important for the nation that the Intelligence Community, the DoD, and other elements of the U.S. Space Community continue to cooperate to provide affordable, high quality space capabilities in an effective and efficient manner when these capabilities are needed. Both the NRO and Air Force acquire and operate state of the art systems, but each provides different capabilities to meet the demands of their different missions. Therefore my focus is not on the integration of "black" and "white" space activities, rather my focus is on working closely with the Air Force, the National Security Space Community, mission partners, and others to ensure that the appropriate agencies leverage each other's capabilities and strengths so that the unique missions perform most effectively and successfully meet the various demands of the space customers.

The NRO maintains continuing, cooperative, and collaborative partnerships with other organizations—particularly the Air Force—on intersecting space issues. These include developing and maintaining a professional space cadre, spacecraft mission assurance, engineering and program management standards, assured access to space, and providing innovative ways to support the warfighter, senior policymakers, and other national security elements. Some of the ways in which we formalized this cooperation include:

—Direct participation in the development of DoD, Undersecretary of Defense (Policy)—led Space Posture Review that outlines how NRO Intelligence, Surveillance, and Reconnaissance (ISR) capabilities are being developed and how these capabilities interact with the capabilities of other DoD agencies and services.

—A joint memorandum between the NRO's Deputy Director for System Engineering and the Commander, Space and Missiles Systems Center (SMC) that initiates collaboration on mission assurance efforts.

—A memorandum of understanding between the NRO, SMC, the National Aeronautics and Space Administration (NASA), and the Defense Supply Center Colum-

[1] The National Geospatial-Intelligence Agency is the functional manager for imagery intelligence and the National Security Agency is the functional manager for SIGINT.

bus to jointly influence the technical content of parts audits and specification reviews at contractor facilities.

—Joint NRO, SMC, NASA, and the Missile Defense Agency sponsorship of the Space Quality Improvement Council. Hosted by the Aerospace Corporation, this forum brings together Air Force, government civilians, and space industry senior leaders to address mutual concerns relative to space systems acquisition.

—The NRO is working with the Undersecretary of Defense (Intelligence) to develop the ISR Integration Road Map. This effort, 2004 Defense Authorization Act Congressionally Directed Action, is aimed at guiding future developments and integration of DoD ISR capabilities where NRO assets play a major role.

—Establishment of U.S. Space Community parts, materials, and processes forums to enhance the exchange and sharing of pertinent information that can affect generic space system development and assure mission success.

—A Senior Industrial Base Council is a National Security Space Forum that addresses policy, regulatory, and technology issues affecting the space industrial base. Membership of this council includes the Undersecretary of the Air Force, the DNRO, the Commander of SMC, and the Director of NSSO.

—Joint SMC and NRO participation in the DoD chaired System Engineering Forum aimed at revitalizing systems engineering and promulgating system engineering best practices in large-scale system development.

As for the future, the NRO will pursue two strategic goals: (1) be the foundation for global situational awareness, a key need for DoD; and (2) provide intelligence within timelines responsive to user needs, again another need in alignment with DoD. This will require that the NRO plan, develop, and manage an integrated architecture focused on creating intelligence value for our users, to include developing new capabilities on the ground to enable overhead capability and cross-flow of information. We can't do this without the strong partnerships of our key stakeholders and established mission partnerships.

Mr. EVERETT. Please explain the concept of Joint Warfighting Space and its value. To make it truly joint, how have the other services been included in the development of a concept of operations and system requirements?

General KLOTZ. The Joint Warfighting Space (JWS) concept envisions a rapid reaction, networked set of space and Near Space capabilities dedicated to the Joint Force Commander (JFC) and integrated with the National Security Space architecture and organic theater systems. From the start, capabilities are expeditionary (people, equipment, training, and exercises) and operationally responsive . . . hours to days versus months to years to provide space effects. Net-centric and machine-to-machine interfaces, using existing communication and Intelligence, Surveillance and Reconnaissance (ISR) architectures will ensure joint operational and tactical forces receive the right information from the JWS assets supporting their operation.

The value of JWS will be measured in the military utility of the space effects provided to joint warfighters. Responsiveness and persistence are important attributes of the JWS concept. Specifically, real-time and/or near real-time effects directly to the tactical commanders in the field, dedicated and integrated capabilities directly under JFC control, and lower cost space/Near Space assets are keys to the success of this concept. Certain space capabilities, such as communications, are often insufficient to satisfy the multiple demands placed on them, especially at lower echelons. Others, such as ISR, cannot always provide the tailored, on-demand persistence necessary to support battlespace awareness. In most cases, the tasking processes are not timely enough to provide the type of response needed by military forces under fire. This JWS concept advocates both material and non-material changes to alleviate these deficiencies. For example, the JWS capabilities will provide theater commanders the ability to control and dynamically re-task payloads on JWS-dedicated overhead assets.

The JWS program is an Air Force program, with joint participation and support. From the start of the program, Air Force Space Command partnered with the other Services in the development of the JWS Operating Concept, which is the cornerstone for key sections of the Operationally Responsive Space (ORS) and JWS Joint Integrated Concept Development Documents that are nearing Joint Requirements Oversight Council (JROC) approval. Army personnel are directly involved with the joint employment of Combat SkySat (AFSPC's first Near Space platform), in the Joint Expeditionary Forces Experiment (JEFX) 2006. Additionally, Air Force Space Battlelab initiated the standup of the Joint Near Space Council with Army, Navy, Coast Guard, USSOCOM and USNORTHCOM participation. This Council provides a forum to share lessons regarding ongoing activities, coordinate future exercises and testing, and serve as program advocates. Draft deployment plans for Combat SkySat include joint participation to field and execute this platform in the USCENTCOM Area of Responsibility. Additionally, AFSPC polled the Combatant

Commands (USSOUTHCOM, USCENTCOM, USSOCOM, USPACOM and USSTRATCOM) regarding capability gaps and determined dedicated communications and persistent ISR are the highest Combatant Commander (COCOM) priorities. All these efforts have led to a truly joint program.

Mr. EVERETT. The Space and Missile Systems Center is looking at standing up an organization with new acquisitions processes that will focus on technical and operational demonstrations while emphasizing innovation and flexibility. Please further describe this organization, the expected value and benefits, and tell us where you intend to put this organization.

General KLOTZ. Air Force Space Command, Space and Missile Systems Center and the Program Executive Officer for Space have established a "back-to-basics" campaign to re-establish rigor and discipline in our space acquisition programs. A key ingredient to this campaign is improving space systems developmental planning and focused technology demonstration.

In the past, an Air Force Special Projects organization provided fast-paced, technically innovative space capabilities through a unique blend of people, authorities, management practices and culture. The new Air Force Special Projects Office will be chartered to manage the diverse set of ongoing space demonstrations. Candidate programs include the following: Affordable Responsive Spacelift (ARES), TACSAT, FALCON, Hypersonic Technology Vehicle (HTV–CAV), Conventional Ballistic Missiles (CBM), and Operationally Responsive Space (ORS).

This organization will leverage new and existing organizational elements, drawing on best practices and performers across the Air Force, as well as from other Services and agencies. The location of this office is under consideration. Essential elements of this organization will include streamlined management and acquisition authorities, which will enable the rapid execution of these projects to improve our space programs "time to market." Our objectives will be to mature promising technologies prior to integration into ongoing or new programs, provide real life performance data to guide the requirements definition, and enable the development of a more informed risk management plan.

QUESTIONS SUBMITTED BY MR. REYES

Mr. REYES. Has the Air Force considered using commercial satellites to obtain some of the capabilities being sought through the development of the Transformational Satellite (TSAT) program? Specifically, could you describe why the Spaceway satellites currently on orbit could not be used to meet parts of the TSAT requirements? Has the Air Force considered procuring a modified version of the Spaceway satellite as a developmental step toward achieving TSAT capabilities?

Dr. SEGA. The Air Force is pursuing a range of satellite capabilities to provide both wideband and protected communications. Wideband systems, both military and civilian, provide very high data rates, but have limited anti-jam and radiation hardening. Protected systems (such as MILSTAR, Advanced EHF (AEHF), and TSAT) provide required assured communication (e.g. command and control of nuclear forces), and are built with robust radiation hardening and anti-jam capabilities.

The Air Force continues to invest in commercial wideband capabilities (e.g. over 80% of the comm for OIF), and in modified commercial systems (e.g. Wideband Gapfiller System (WGS)). Commercial systems, though, are not able to fulfill Protected Communication requirements, due primarily to their lack of radiation hardening and anti-jam capabilities.

Modifying commercial systems, such as Spaceway, to meet all of the Protected Communication requirements tends not to be cost effective, but the government continues to assess new satellite technologies and capabilities. To that end, TSAT will leverage the technology, integration, and experience gained in the development of Spaceway and other commercial systems, and ensure they are considered as the TSAT antennas and space vehicle are developed.

Mr. REYES. The Army's Future Combat Systems (FCS) is slated to be a major initial user of TSAT. Has the Air Force considered using the commercial alternatives during FCS initial testing and fielding? How has the Air Force been working with the Army to ensure that their timelines match up?

Dr. SEGA. The requirements that define TSAT and its first block were developed through a DoD-wide Quadrennial Defense Review (QDR) process, in which the Combatant Commands and the Army had key roles. Additionally, the Air Force continues to work closely with the Army through multiple forums to include the TSAT Users Forum, quarterly TSAT Program Reviews, and the TSAT Authors Group, which is responsible for documenting TSAT requirements in the TSAT Capability Development Document. Any use of commercial alternatives during initial testing

and fielding of FCS would be determined by the Army, and the Air Force would collaborate on any potential civilian options.

Mr. REYES. The FY 2007 funding request for TSAT is more than double the FY 2006 spending level. Please explain why the Air Force believes that such an increase in funding can be spent effectively. What are the major testing and hardware deliverables associated with this increase?

Dr. SEGA. The FY 2007 funding request was developed to meet warfighter needs by executing the program plan to carry two contractors through technology and concept development. The funding profile is executable.

In addition to the space segment risk reduction and system definition, the FY 2007 request includes technology maturation, TSAT requirements definition activities; TSAT Mission Operations System (TMOS) development and integration with the Global Information Grid (GIG); and system engineering and integration activities, all culminating in the program level System Design Review in 3QFY07.

Key technology integration/maturation will be demonstrated during Test Event II, scheduled for Nov. 2006 through Feb. 2007. During this event, both space segment contractors will conduct brassboard lasercom and next generation processor/router demonstrations. These independent government tests serve to reduce technical risk by maturing the critical technologies to Technology Readiness Level 6, the benchmark for entering program design. Other FY07 efforts include life testing and modeling of key components in the lasercom system (e.g. pump diodes) and developing the network management and mission operations segment.

Mr. REYES. Please provide a detailed breakout of resources across the entire Department of Defense devoted to Operationally Responsive Space contained within the present Five Year Defense Plan.

Dr. SEGA. In the current FYDP, Operationally Responsive Space (ORS) includes TacSats, associated launch vehicles, and responsive launch development, and is broken out below:

TacSat 1 (Ready for Launch)

Office of Force Transformation (OFT) is sponsor, NRL is technical lead, Air Force is lead for launch.

Funding Sources Summary: ~$20.7M total, FY03–06 (Launch, OFT & NRL Funding)

TacSat-2: $65.0M total, FY04–07 (In Final Integration/Environmental Testing)

FY04 and Previous $18.9M
FY05 $14.3M
FY06 $21.9M
FY07 $9.9M

Funding Sources Summary:

- AFSPC: $19.8M (Launch)
- AFRL: $32.5M (SV/Payload)
- Space Warfare Center (SWC): $1.7M (Military Utility)
- Space Test Program (STP): $1.0M (Launch-related)
- DUSD (AS&C): $6.7M (ACTD Funds)
- OFT (via NRL): $0.3M (Payload)
- Navy/ONR: $3.0M (Navy Payload)

TacSat 3: $54.4M total, FY05–08 (In Development)

FY05 $12.8M
FY06 $21.2M
FY07 $19.1M
FY08 $1.3M

Funding Sources Summary:

- AFSPC: $19.8M (Launch, Range, Ops)
  NOTE: Currently there is a $19.1M shortfall in addressing this requirement; the Air Force plans to reprogram funds to address this shortfall.
- AFRL: $15.4M (Payload/Processor/Integration/Ground Station/Payload Ops)
- Army SMDC: $5.0M (Payload)
- OFT, AFRL, others: $14.2M (Modular/Spacecraft Bus)

TacSat 4: TBD total, FY06–FY09 (Early Planning/Requirements Definition)

FY06 $16.2M
FY07 $7.2M
FY08 and beyond TBD

Funding Sources Summary:

- AFSPC: ~$27M TacSat-4 is being worked as part of the FY08 POM process
  - Launch cost increase due to different launch vehicles used (Minitaur 4 vs Minitaur 1 used for TacSat 1, 2)
- Naval Research Labs (NRL): $16.0M (Payloads, Integration, Ground Terminals)
- OFT: TBD $M (Modular Spacecraft/Bus)

Small Launch Vehicle

- Joint AF-Defense Advanced Research Projects Agency (DARPA) Falcon Program with NASA participation
- $142.3M Total, FY03–09
  - Air Force - $127.8M
  - DARPA - $4.5M
  - NASA - $10.0M

Affordable Responsive Space (ARES)

AF - $180.1M total, FY07–11
- FY07 New Start

Mr. REYES. Just after arriving in your new job, you had the opportunity to evaluate the acquisition problems with SBIRS-High and to help shape a new procurement strategy for that system in response to a Nunn-McCurdy breech.

1. Could you discuss why you think this program, which represents a relatively moderate technology upgrade to the DSP program that it will replace, became so troubled?

2. Based on your experience with this program and the other space acquisition problems that you have been managing, what in your view is the single most important structural change that we should make to the acquisition process?

Dr. SEGA. 1. SBIRS High is a complex system providing extensive support to four mission areas, versus the two missions of DSP. The aggregated requirements challenge was significant given the maturity of the technology proposed to meet these requirements.

In November 2001, the Air Force chartered a joint government/contractor Independent Review Team (IRT). They found:

- Technology was too immature to enter detailed System Design and Development (i.e. EMD).
- System requirements decomposition and flow down were not well understood as the program continued to evolve.
- Significant problem in execution management.

In 2002, the program was certified, rebaselined and fixes were put in place to correct these problems.

As HEO payload testing progressed, we discovered Electromagnetic Interference (EMI) between the host and the payload, and extensive latent quality defects in existing hardware already built. On March 10, 2005, the Acting SECAF notified Congress of another Nunn-McCurdy cost breach. He directed an Independent Program Assessment (IPA). The IPA found the SBIRS program continued to experience problems with integration, software and systems engineering, remaining from before the 2002 restructure. The IPA found insufficient schedule and budget margin for robust GEO first article integration and test.

The SBIRS program "overreached" in trying to meet the various user requirements all at once, rather than taking a block approach and building up to achieve the full SBIRS capability.

2. The most important structural change we can make to the acquisition process is to implement a Back to Basics philosophy that reflects a "walk before you run" program construct in three key areas. The cornerstone of the Back to Basics philosophy is to use an evolutionary acquisition approach that reapportions risk—allows higher risks in the earlier stages (science and technology and technology development) and reduces risks in system production by using more mature technologies. We must also pursue a "Back to Basics" philosophy in terms of recruiting and training our space acquisition workforce. We must also ensure that our acquisition workforce is properly educated and trained and that our space professionals have the tools and training necessary to operate these systems.

Mr. REYES. Experts within the cost estimating community have told GAO that cost estimators are more likely to prepare accurate, risk-based cost estimates if the estimators are independent of the acquisition chain of command. The Navy has adopted this model and has found that it increases opportunities for learning and career growth as well as more accurate cost estimates.

1. Has the Air Force considered adopting the Navy's model of centralizing its cost estimating resources?

2. Should the Air Force consider increasing the Air Force Cost Analysis Agency's involvement in providing independent assessments of space programs?

Dr. SEGA. In building a strategy to improve Air Force (AF) cost estimating, we have considered numerous options; from centralizing the cost functions at each of the Major Commands/Product Centers to completely centralizing AF cost estimating. We are currently developing a comprehensive plan to improve AF cost analysis that capitalizes on a blend of centralized and decentralized cost resources. This plan will hold the Program Executive Office responsible and accountable for establishing and sustaining a reliable cost estimating capability, and establishes the necessary headquarters oversight and guidance to ensure that credible, independent AF cost estimates are developed.

The plan will also include an expanded independent cost assessment requirement for effective program executive office and corporate-level oversight of major programs. The Air Force Cost Analysis Agency (AFCAA) will perform independent assessments of program costs, both earlier and more often, for all major Air Force acquisition programs.

QUESTIONS SUBMITTED BY MR. SPRATT

Mr. SPRATT. The cost of putting an object in space has been estimated by some to be as high as $22,000 per kilogram. You mentioned using smaller satellites in your oral testimony as one way to lower launch costs. Are there any other ongoing projects to lower the cost of launch?

Dr. SEGA. The Air Force's Operationally Responsive Space (ORS) efforts are addressing both quick reaction and low-cost launch through both the Air Force/DARPA Falcon Program's Small Launch Vehicle (SLV) and the Affordable Responsive Spacelift (ARES) efforts.

Mr. SPRATT. What is the status of the Transformational Satellite Program? What activities planned for this year justify more than doubling the budget for this program from $436.8 million in FY06 to $867.1 million proposed for FY07?

Dr. SEGA. The FY 2007 funding request was developed to meet warfighter needs by executing the program plan to carry two contractors through technology and concept development. The funding profile is executable.

In addition to the space segment risk reduction and system definition, the FY 2007 request includes technology maturation, TSAT requirements definition activities; TSAT Mission Operations System (TMOS) development and integration with the Global Information Grid (GIG); and system engineering and integration activities, all culminating in the program level System Design Review in 3QFY07.

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Mr. SPRATT. Can you tell us what you can on the open space record about space weapons, space counter-space?

Dr. SEGA. In May 2001, when Secretary of Defense Rumsfeld announced the implementation of the Space Commission, he emphasized two key points concerning to our National Space Policy: "The United States is committed to the exploration and use of outer space by all nations for peaceful purposes for the benefit of all humanity. Peaceful purposes allow defense and intelligence-related activities in pursuit of national security and other goals." The SECDEF went on to say "Consistent with treaty obligations, the United States will develop, operate and maintain space control capabilities to ensure freedom of action in space, and if directed, deny such freedom of action to adversaries." Our national policy in this area has remained consistent over the last decade.

Counterspace Operations consist of space situational awareness (SSA), defensive counterspace (DCS), and offensive counterspace (OCS). SSA forms the foundation for all counterspace actions and includes traditional space surveillance, detailed reconnaissance of specific space assets, collection and processing of space intelligence data, and analysis of the space environment. DCS preserves US/allied ability to exploit space to its advantage by protecting friendly space related capabilities from enemy attack or interference. OCS operations preclude an adversary from exploiting space to his advantage.

Mr. SPRATT. The department has undertaken and proposed a number of acquisition reforms intended to address some of the problems highlighted by the GAO. Can

you outline for us what reforms have taken place already and what results you have seen? Also, what new proposals do you anticipate putting in place in the future and to what?

General KLOTZ. Air Force Space Command (AFSPC) is working with our operational communities to improve the Joint Capabilities Integration and Development System (JCIDS) process to make it more timely and responsive, and to advance requirements and development in an incremental approach.

We also implemented an improved acquisition model—a block acquisition process for developing and fielding space systems that we describe as a "back to basics" acquisition strategy.

Key to this strategy is a redistribution of risk from the production line to the earliest stages of a space program's life cycle. We are now proceeding with more mature technologies, more stable requirements, and placing more discipline in systems design. The expectation is cycle times will be reduced and we'll be able, with higher confidence, to maintain cost and schedule, and produce capabilities by synchronizing science and technology, technology development, systems development and demonstration, and systems production. Space Radar, Global Positioning System (GPS), Space-Based Space Surveillance (SBSS), and Transformational Satellite (TSAT) are path-finding this improved process.

Essential elements to the "back to basics" acquisition approach are as follows: (1) Make mission success the #1 priority, (2) re-baseline all AFSPC acquisition policies and processes (National Security Space Acquisition Policy 03–01 and the urgent and compelling needs process), (3) return to rigorous engineering and test processes, (4) improve cost estimating and funding stability, (5) control requirements creep and independent reviews, and (6) improve the space acquisition workforce professional development to include keeping Program Managers in place for longer tours and education through our Space and Missile Systems Center (SMC) Acquisition School.

Mr. SPRATT. Does the United States Air Force currently have plans, programs and budget initiatives to engage in "offensive counter-space operations," as directed in Air Force Doctrine Document 2–2.1, entitled "Counterspace Operations," dated August 2, 2004? If so, have these policies been discussed with U.S. allies that might be affected?

General KLOTZ. Air Force counterspace operations, underpinned by space situation awareness, support both the space control mission of USSTRATCOM and theater military operations. Offensive Counter Space (OCS) operations are intended to preclude an adversary from exploiting space to their advantage and may target an adversary's space capability (space systems, terrestrial systems, links, or third party space capability), using a variety of permanent and/or reversible means (the preferred option). As adversaries become more dependent on space capabilities, counterspace operations have the ability to produce effects that directly impact their ability and will to wage war at the strategic, operational and tactical levels.

Our current counterspace efforts, aimed at preventing an adversary from using space-based capabilities against US and Allied forces, are focused on counter communications capabilities. The first fielded Counter Communication System (CCS) reached Initial Operational Capability in September 2004. The system has the ability to reversibly deny or disrupt an adversary's use of satellite-based communications deemed to be hostile, without causing permanent damage. To meet the continued growth in the use of satellite communications, we are planning to field more CCSs with added capabilities throughout the current Future Years Defense Program (FYDP).

We have also engaged our Allied partners in counterspace discussions through such forums as the Schriever Wargaming series and the US—Australia Bilateral Space Forum. A recent Schriever IV Senior Policy Seminar held in Washington DC included representatives from the United Kingdom, Canada, and Australia. Working groups have been formed to discuss future policy implications of counterspace operations, including Allied participation and support. These forums facilitate ongoing dialogue with our Allies and assist them in coordinating future space planning efforts.

Mr. SPRATT. How does the USAF plan to use TacSats to improve major space systems technology, acquisition, and employment? Specifically provide intended launch vehicles, launch schedules, and experiments to be conducted for the next 5 years, and 10 years. Describe the impediments you see to an accelerated launch schedule, and what specific efforts have been undertaken to accelerate the launch schedule of TacSats, the results of those efforts and a timeframe for completion.

General KLOTZ. TacSats are designed to be complementary to major space systems, not to replace them. TacSats focus on tactical applications to support the Joint Force Commander (JFC) during conflict for enhanced capabilities in areas such as communication and information gathering.

There are several ways TacSats can improve major space systems technology, acquisition, and employment. Specifically:

- Follow-on operational versions of TacSats will provide responsive capacity and coverage for surge, augmentation or to restore space capabilities.
- TacSats provide a platform for science and technology development, risk reduction, and technology maturation for major space systems.
- TacSats provide opportunities for major space systems to capitalize on streamlined acquisition practices such as the use of standard interfaces and common bus architectures. Major space systems may also benefit from the lessons learned through the military utility assessments of ORS satellites supporting JFC real-world needs.

The TacSat experiment schedule for the next three years follows:

Payload	Launch Vehicle	Launch Date
TacSat-1	Space X Falcon 1 SLV	CY2006
Experiment:	Low resolution imaging and RF locator	
Sponsor:	Naval Research Labs (NRL)	
TacSat-2	TBD	May 2007
Experiment:	High resolution imaging and RF locator	
Sponsor:	Air Force Research Labs (AFRL)	
TacSat-3	TBD	July 2007
Experiment:	Hyperspectral imagery	
Sponsor:	Air Force Research Labs (AFRL)	
TacSat-4	Minotaur IV	CY2008
Experiment:	Communications on the move and Blue-Force Tracking	
Sponsor:	Naval Research Labs (NRL)	

The TacSat 2 and 3 launch vehicle request for proposals was issued 6 Apr. 2006. Proposals are due in May and we expect to be on contract by June 2006. The competitors are Space X with the Falcon vehicle and Orbital with the Raptor or Minotaur.

Future TacSats are planned to occur on roughly an annual basis. Experiment selection will be based on Combatant Commanders' needs.

Funding for small satellite standard or common bus development, launch vehicle procurement and the lack of low-cost small launch vehicles are impediments that hinder the acceleration of the TacSat experiments. Steps have not been taken to accelerate the launch schedule beyond the available funding.

Mr. SPRATT. How do USAF programs outlined in question 3 differ from or agree with other DOD efforts, and why?

General KLOTZ. The TacSat experiments focus on requirements identified and vetted by the Combatant Commanders and each of the Services. In general, the cost and life spans of small satellite constellations should be significantly lower than traditional large scale space systems.

The Air Force has received considerable Congressional attention with respect to the TacSat program. We continue working to establish a common position that synchronizes an Operationally Responsive Space (ORS) vision and mission across OSD, the military Services, agencies and Combatant Commanders. We conduct weekly teleconferences to address TacSat issues with the Air Force and Navy Lab communities, as well as the Intelligence Community, Army, Navy, Marine Corps, OSD Office of Force Transformation (OFT), and National Security Space Office (NSSO) representatives in order to achieve unity of effort for the TacSat program and ORS.

Mr. SPRATT. What efforts has the USAF undertaken to utilize the relatively lower cost of operating in the near space environment to accomplish any of its space system goals? Please explain.

General KLOTZ. Air Force Space Command (AFSPC) embarked on an ambitious Near Space roadmap to support AFSPC's #1 priority to "Secure the Space Domain and Provide Space Combat Effects to Joint Warfighters." The Near Space roadmap uses a 3-tiered approach:

Tier 1—Near Space Analysis and Program Development. This activity includes the following: (a) Establishment of a Near Space program office with the Space and Missile Systems Center to perform research, development, testing and

demonstration, and most importantly, establish agile contracting to meet warfighter quick reaction needs. (b) Conduct Studies and Analysis: The Air Force, other Services, and other agencies have performed studies on Near Space, and we continue to support these current and future studies in this area. (c) Begin the process of adding Near Space to our Integrated Programming and Planning process to effect the Science and Technology roadmaps as well as our future planning needs for Program Objective Memorandum analysis and funding.

Tier 2—Quickly transition Near Space demonstrations to operational systems. Primary interfaces are with the Air Force Space Battlelab (AFSB) and Air Force Tactical Exploitation of National Capabilities (TENCAP). The Battlelab is pursuing multiple Near Space demonstrations, most notably Combat SkySat. Combat SkySat is a balloon-borne, free-floating platform carrying a maximum payload weight of 6 lbs. in Near Space. Combat SkySat is an initiative with Joint Expeditionary Forces Experiment (JEFX) 2006 to provide inexpensive Beyond Line of Sight communication enhancement capability for our Air Force Special Operations Command forces. Additionally, we are in our final demonstration phase for TENCAP developed Talon TOPPER project. Talon TOPPER is a balloon-borne, free-floating platform carrying a payload return vehicle which detaches from the balloon at the end of a mission and returns up to a 30 lb. payload to a predetermined location. Finally, we are working with the United States Special Operations Command (USSOCOM), Army, and Intelligence Community to pursue a high altitude, long-loiter capability. This low-cost, but highly agile set of capabilities provides the Air Force with a complementary suite of platforms that could deploy to support the tactical commander: All are designed with an expeditionary focus. The expendable Combat SkySat systems, the Talon TOPPER payload return systems and the final high altitude, long-loiter systems provide a very persistent, dedicated and responsive set of Near Space platforms designed to meet existing Combatant Command and Air Force Space priorities.

Tier 3—Longer range planning and wargaming. Using wargames like Schriever III, IV and beyond, Ulchi Focus Lens, and supporting predeployment exercises with the joint community at our National Training Centers are examples of efforts ongoing in this Tier. AFSPC is committed to pursuing low-cost Near Space capabilities and taking responsive actions as the "lead Service" for this new environment. Secretary of the Air Force, The Honorable Michael Wynne, reinforces this approach by stating, "From air to lack of air, ultimately to zero space, this (Near Space) is an area that we think, that as an Air Force, we need to exploit."

QUESTIONS SUBMITTED BY MS. SANCHEZ

Ms. SANCHEZ. The Mission Description for the Advanced Optics and Laser Space Technology Project (PE 0603605F, Project No. 11SP) states: "This project provides for the demonstration and detailed assessment of space unique technologies needed for advanced optical systems and high-energy laser weapons."

One major thrust of this project is to: "Perform atmospheric compensation/beam control experiments for application including anti-satellite weapons, relay mirror systems, satellite tests and diagnostics, and high-resolution satellite imaging." In FY 2007, $5.71 million is requested to: "Demonstrate fully compensated laser propagation to low earth orbit satellites; measure beam profile and intensity on target. Begin development of precision aimpoint stabilization through turbulence."

Another major thrust of this project is to: "Develop and demonstrate advanced optical beam control technologies for laser propagation through severe and/or extended atmospheric turbulence." In FY 2007, $14.9 million is requested to: "Integrate advanced ground test system for characterization of laser propagation through atmospheric turbulence. Demonstrate and characterize operation of advanced adaptive optical and tracking technologies for laser propagation to space targets in stressing atmospheric conditions."

Please explain the details of these demonstrations. Specifically, will either of these demonstrations result in any physical or operational damage to an orbiting satellite?

Dr. SEGA. The atmospheric compensation/beam control experiments, as part of Air Force Science and Technology programs, described in the Advanced Optics and Space Technology project in Program Element 0603605F, Advanced Weapons Technology, will not result in any physical or operational damage to an orbiting satellite. These experiments propose to use a low power lasers to develop advanced beam control technology for high-resolution imaging applications. Low power lasers are used to compensate for atmospheric turbulence and illuminate space objects for tracking/imaging, with primary application being Space Situational Awareness.

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The plain reading of the budget justification for this project raises the issue that these demonstrations could be considered a test of an anti-satellite weapon. Please explain why this is not true. Or, conversely, please identify the policy guidance that authorizes such a test.

Dr. SEGA. The atmospheric compensation/beam control experiments and their potential anti-satellite weapons application described in the Advanced Optics and Space Technology project in Program Element 0603605F, Advanced Weapons Technology, are not intended to be, nor should they be considered as, a test of an anti-satellite weapon. These experiments propose to use low power lasers to develop advanced beam control technology for high-resolution satellite imaging and to provide technology for future applications. Low power lasers are used to compensate for atmospheric turbulence and to illuminate space objects for tracking and imaging. This technology has many potential applications, including relay mirror systems, satellite tests and diagnostics, and high-resolution imaging.

QUESTIONS SUBMITTED BY MR. LARSEN

Mr. LARSEN. Can you describe the status of the program on TSAT? And can you give us, say, over the next 12 months what are some key events that will exist in the TSAT program that will give us here in Congress some ability to measure the progress and gain some confidence in that program?

Dr. SEGA. The FY 2007 funding request was developed to meet warfighter needs by executing the program plan to carry two contractors through technology and concept development. The funding profile is executable.

In addition to the space segment risk reduction and system definition, the FY 2007 request includes technology maturation, TSAT requirements definition activities; TSAT Mission Operations System (TMOS) development and integration with the Global Information Grid (GIG); and system engineering and integration activities, all culminating in the program level System Design Review in 3QFY07.

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QUESTIONS SUBMITTED BY MR. CALVERT

Mr. CALVERT. The FY06 DoD Appropriations Conference Report (Conf. Rpt. 109–359) includes a section entitled, "Evolved Expendable Launch Vehicle (EELV)" and states in part, "The conferees . . . direct the elimination of multi-year 'allocations,' 'pre-awards,' and 'block buys' from Buy-3 and future EELV launch services contracts." The Air Force has represented that EELV launch services contracts are to be awarded annually. For instance, the first award in Buy-3 will made in FY06 for launch in FY08 and covers three (3) of the twenty-two (22) total EELV Buy-3 missions. The remaining nineteen (19) launches, however have been expressly allocated (though not awarded) to the Boeing Company and Lockheed Martin in the Buy-3 RFP. Critically, the remaining 19 EELV Buy-3 launches span from FY07 through

FY11. In a letter to my office dated March 6, 2006, you stated, "[t]he remaining 19 Buy-3 EELV launch services will be allocated and procured on an annual basis." Please explain in detail how the allocation of these 19 launches, which appear to span from FY07 through FY11, comports with Congress' directive to the Air Force to eliminate "mutli-year 'allocations' and 'pre-awards.'" Going forward, please describe how the Air Force plans to eliminate multi-year allocations.

Dr. SEGA. The Air Force is compliant with the FY06 DoD Appropriations Conference Report. Per the conference report, the Air Force intends to assign and procure the remaining 19 Buy-3 EELV launch services on an annual basis. This means that in every year of the projected 4-years of Buy III launches, the USAF will assign and procure only the launch services that must be ordered in the next fiscal year for launch two years later. The April 21, 2005 EELV Launch Services RFP notified the contractors that "[t]he Government reserves the right to award, reallocate, and/or reschedule these un-awarded launch service missions, or to not make any launch service awards."

Mr. CALVERT. Dr. Sega, while I am aware that the National Polar-orbiting Operational Environmental Satellite System (NPOESS) is undergoing a Nunn-McCurdy recertification, we all agree that improved weather satellite data systems, such as NPOESS, will prove invaluable to our warfighters, as well as to our domestic preparedness in dealing with certain natural disasters. Can you characterize for the Committee how these new sensors and ground system will improve conditions for our warfighters, as well as the steps the Department is taking to ensure that our warfighters get this improved capability as early as possible?

Dr. SEGA. Collectively, the impact of the new NPOESS sensors and ground system will be a more robust knowledge of the environment, which equates to an asymmetrical advantage for our warfighters. NPOESS' sensors will provide critical environmental data to the warfighters faster than the current architecture, enabling better weather modeling to help ensure the success of our operations. Data from the NPOESS sensors ultimately will provide both US and coalition forces greater ability to anticipate the effects of the environment, thereby, allowing warfighters to more effectively employ our weapon systems in good weather and in bad.

To ensure NPOESS data is provided to troops as quickly as possible, a critical focus is to develop an initial set of the first flight units that will be flown on the NPOESS Preparatory Project (NPP). Through the Nunn-McCurdy recertification process, DoD is working with the Department of Commerce (DOC) and NASA to implement a strategy that ensures continuity of service with the existing Polar Operational Environmental Satellites (POES) and Defense Meteorological Satellite Program (DMSP) constellations, while delivering the necessary NPOESS capabilities as quickly as possible.

Mr. CALVERT. The FY06 DoD Appropriations Conference Report (Conf. Rpt. 109–359) includes a section entitled, "Evolved Expendable Launch Vehicle (EELV)" and states in part, "The conferees . . . direct the elimination of multi-year 'allocations,' 'pre-awards,' and 'block buys' from Buy-3 and future EELV launch services contracts." The Air Force has represented that EELV launch services contracts are to be awarded annually. For instance, the first award in Buy-3 will be made in FY06 for launch in FY08 and covers three (3) of the twenty-two (22) total EELV Buy-3 missions. The remaining nineteen (19) launches, however, have been expressly allocated (though not awarded) to the Boeing Company and Lockheed Martine in the Buy-3 RFP. Critically, the remaining 19 EELV Buy-3 launches extend from FY07 through FY11. Please explain in detail how the allocation of these 19 launches from FY07 through FY11 comports with Congress' directive to the Air Force to eliminate "multi-year 'allocations' and 'pre-awards.'" Further, please describe how the Air Force plans to eliminate multi-year allocations.

General KLOTZ. The Air Force intends to assign and procure the remaining 19 Buy-3 EELV launch services on an annual basis. This means that every year through the projected 4-years of Buy III launches, the Air Force will assign and procure only the launch services that must be ordered in the next fiscal year for launch two years later. The 21 Apr. 2005 EELV Launch Services Request For Proposal (RFP) notified the contractors that "the Government reserves the right to award, reallocate, and/or reschedule these un-awarded launch service missions, or to not make any launch service awards."

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